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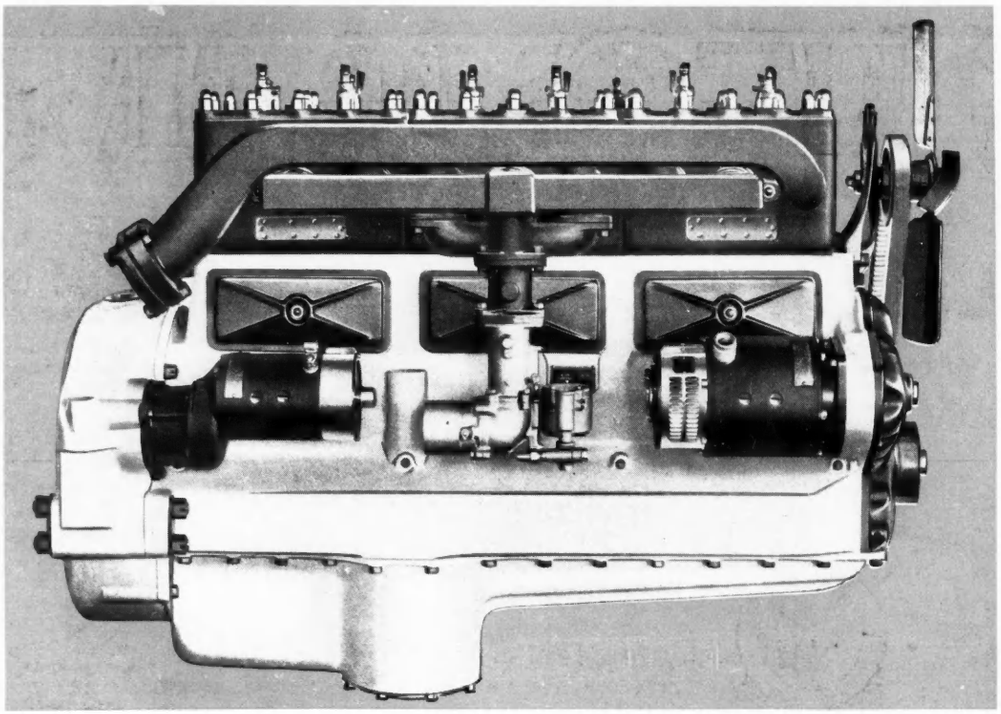

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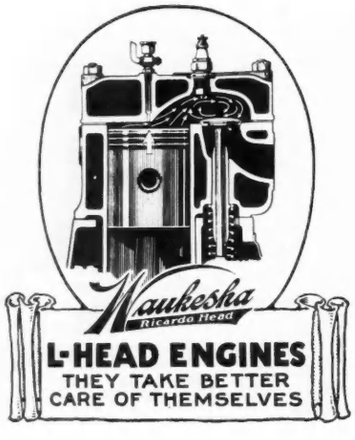

928

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AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

Reg. U. S. Pat. Off.
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Contents

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AUTOMOTIVE INDUSTRIES
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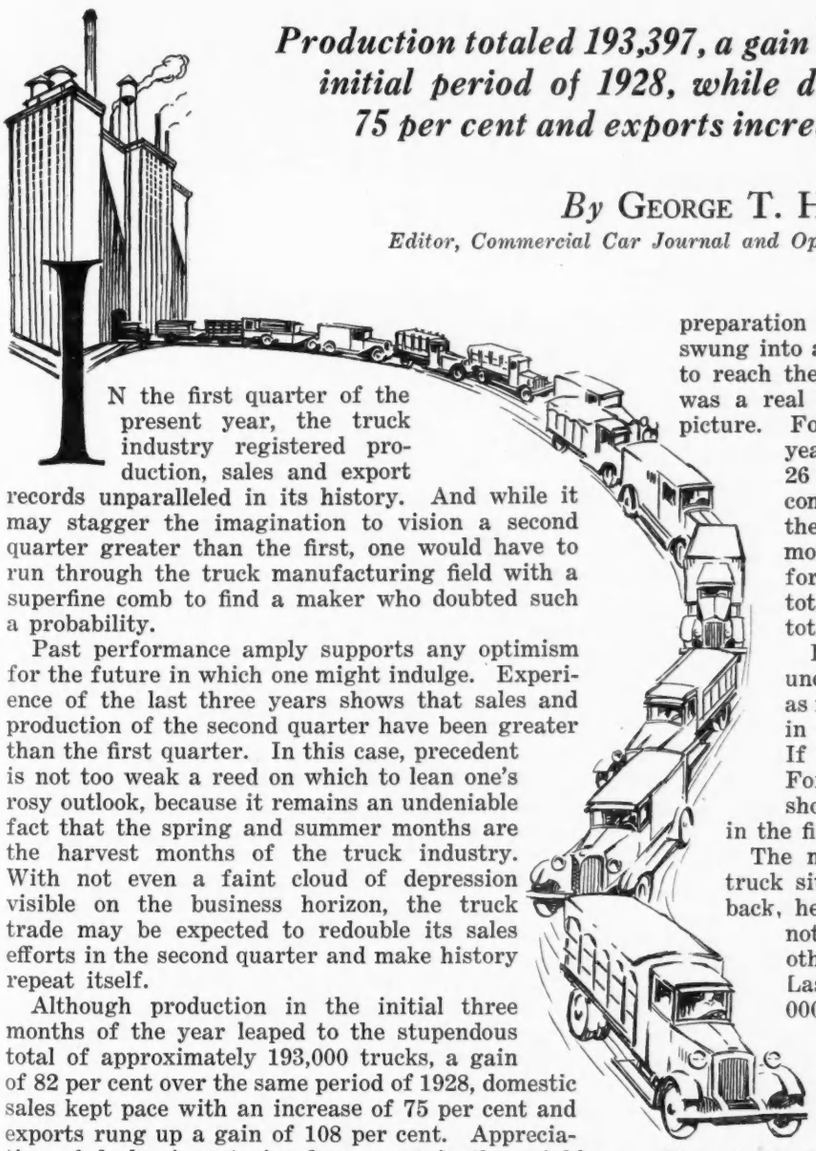
Truck Industry *Sets Records In Year's* First Quarter

Production totaled 193,397, a gain of 82 per cent over the initial period of 1928, while domestic sales grew 75 per cent and exports increased 108 per cent.

By GEORGE T. HOOK
Editor, Commercial Car Journal and Operation & Maintenance



IN the first quarter of the present year, the truck industry registered production, sales and export records unparalleled in its history. And while it may stagger the imagination to vision a second quarter greater than the first, one would have to run through the truck manufacturing field with a superfine comb to find a maker who doubted such a probability.

Past performance amply supports any optimism for the future in which one might indulge. Experience of the last three years shows that sales and production of the second quarter have been greater than the first quarter. In this case, precedent is not too weak a reed on which to lean one's rosy outlook, because it remains an undeniable fact that the spring and summer months are the harvest months of the truck industry. With not even a faint cloud of depression visible on the business horizon, the truck trade may be expected to redouble its sales efforts in the second quarter and make history repeat itself.

Although production in the initial three months of the year leaped to the stupendous total of approximately 193,000 trucks, a gain of 82 per cent over the same period of 1928, domestic sales kept pace with an increase of 75 per cent and exports rung up a gain of 108 per cent. Appreciation of dealer inventories figures out in the neighborhood of 15,000 units—a normal condition.

The frog that hopped into the center of the truck pond and extended record ripples to well-nigh fantastic limits is none other than the Ford company.

Back in 1928, Ford found time to build about 8700 commercial vehicles. Now that its period of Model A preparation has been completed, the company has swung into a stride that by August should enable it to reach the heights it occupied when the Model T was a real force and not, so to speak, a moving picture. Ford output in the first quarter of this year was approximately 50,200. This was 26 per cent of total truck production as compared with the 40 per cent enjoyed in the corresponding quarter of 1926, when T models held public favor. Ford truck sales for the same period were 42 per cent of total truck sales in 1929 and 56 per cent of total in 1926.

In the second quarter of 1929, Ford will unquestionably play the same leading role as in the initial quarter. Dealers are behind in their deliveries and begging for trucks. If their demands are satisfactorily met, Ford retail sales in the next three months should be at least 25 per cent better than in the first three.

The most satisfying thing about the entire truck situation is that whereas Ford is coming back, he is coming back into his own, and is not making inroads on the markets of other makers. Statistics prove the point. Last year when Ford fell to 4400 from 40,000 truck sales in 1927, the rest of the truck industry recorded a gain of 13 per cent from 47,000 to 54,000. (All of these figures are approximate; accompanying tables contain more exact ones.) In the first quarter of 1929, although Ford went from 4400 to 43,000, the other makers registered an 11 per cent increase from 54,000 to 60,000. These figures lead to the obvious conclusion that Ford's loss was not the others' gain to the extent one might offhand expect in such a circumstance.

Therefore, it would be quite logical to suppose that the other truck makers have expanded their mar-

kets healthily without dependence on any temporary inheritance from the Ford slump, and have maintained and enlarged these markets in the face of Ford's return to pristine vigor. A more salubrious condition would be difficult to imagine.

The export market has been a source of great profit and no end of satisfaction to other-than-Ford truck manufacturers. It was so last year and is expected to be even more so this year, and the first quarter realized these expectations auspiciously.

Ford's truck production for the first quarter of this year topped domestic sales by some 7000 units. Even if all these 7000 vehicles took to the sea and found their way to foreign climes, it would still be very evident that Ford has not yet begun to give the export market the attention—to say nothing of cultivation—it invites and deserves. It is in this field of exports that the other truck makers have been making most impressive advances. Last year, while the Ford organization was beating its breast and tearing its hair (perhaps a mild description of the actual condition) the rest of the industry was largely responsible for a 50 per cent truck export increase over 1927, when Ford occupied the foreground of the truck picture. In the first three months of 1929, the entire industry's increase over the corresponding portion of 1928 was 108 per cent, in which other-than-Ford manufacturers played by far the most conspicuous part—to the extent of at least 80 per cent.

Judging by first quarter accomplishments, the positive convictions of factory executives with regard to the rest of the year, and Ford's renascence, there is every reason to predict—even as early as April—that unless a king or a duke or something is knocked off with internationally cataclysmic results, the truck industry will turn the corner to 1930 with at least a 50 per cent export increase over record 1928.

Among the factors supporting an optimistic opinion of the truck industry's immediate future are general prosperity shared alike by industrial and agricultural districts; stabilization of markets abroad, opening larger export possibilities; significant departures from formerly accepted design, and the growing demand for fleets of trucks on the part of corporations and individual operators who realize the economy and dependability of motorized units for delivery and distribution.

The results of the first three months are a significant corroboration of the views expressed to the writer by leading factory executives with regard to the outlook for 1929. Truck executives have ever been conservatively inclined, especially in their predictions, so that when they expressed an almost unanimous opinion that in 1929 the truck industry would kick all previous records off the shelf—and kick them high, wide and handsome—it was to be assumed that they had no business corns—and expected none—to hamper their efforts.

Truck Production, Sales and Exports

Truck Exports, U. S. and Canada

	1929	1928	% Increase
January	19,900	13,800	44
February	26,500	11,000	141
March	29,000	11,500	152
1st Quarter	75,400	36,300	108

Truck Production, All Makes, U.S. and Canada

	1929	1928	% Increase
January	55,941	27,840	101
February	61,296	34,834	76
March	76,160	43,735	74
1st Quarter	193,397	106,409	82

U. S. Truck Sales, All Makes

	1929	1928	% Increase
January	29,450	16,423	79
February	33,000	17,513	88
March	40,000	24,757	62
1st Quarter	102,450	58,693	75

Comparative Ford Truck Production Analysis

1st Quarter	Ford	All Makes	% of Total
1929	50,200	193,397	26.0
1928	8,700	106,409	8.2
1927	52,580	139,291	37.7
1926	49,470	124,107	39.9

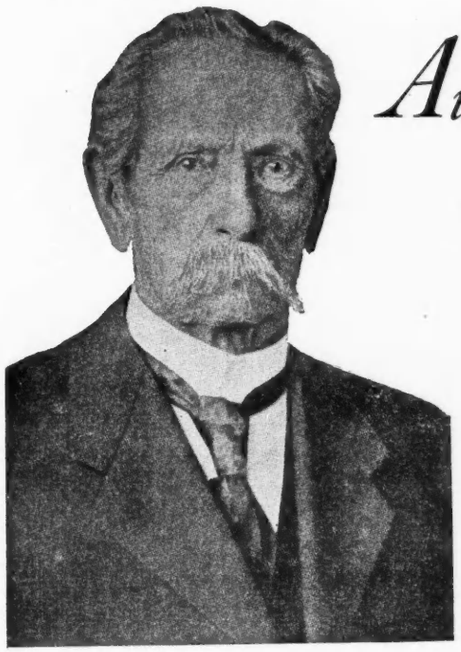
Comparative Ford U. S. Truck Sales Analysis

1st Quarter	Ford	All Makes	% of Total
1929	42,859	102,450	41.8
1928	4,416	58,450	7.5
1927	40,207	87,535	45.9
1926	47,852	85,580	55.9

Truck Dealer Inventory Increase

U. S. 1929 First Quarter Production		184,897
U. S. 1929 First Quarter Sales	102,450	
U. S. 1929 First Quarter Exports (Including Foreign Assemblies	67,400	169,850
U. S. Dealer Stock Appreciation in First Quarter		15,047

In the above tables 1929 March truck production and exports and February and March sales are conservatively estimated, the latter on the basis of partial returns



Carl Benz

Automotive Beginnings Recalled by Death of *Carl Benz*

He was credited with building the first complete vehicle propelled by a liquid-fuel, internal combustion engine. This automobile was demonstrated by him in 1885.

IN lamenting the passing of Carl Benz, who died in his eighty-fifth year in Ladenburg near Mannheim, Germany, on the night of April 3, the automotive industry throughout the world pays tribute to the man credited with building the first complete vehicle propelled by a liquid-fuel, internal-combustion engine. This first gasoline automobile, a three-wheeled affair, was later exhibited at world's fairs and important automobile shows, and now occupies a place of honor in the German Museum at Munich. For a number of years, he worked on the development of the vehicle as head of the firm of Benz & Co., and in 1889, when the business was transferred to a stock company, he moved to Ladenburg.

Carl Benz was born in Karlsruhe on Nov. 25, 1844. He probably inherited an interest in mechanics from his father, who was a locomotive engineer. The elder Benz was killed in a railway accident and Carl was thrown upon his own resources while still a youth. Determined to acquire a technical education, he found means to enable him to attend the Karlsruhe technical college for four years. During the two and one-half years following his college course, he was employed at an engine factory in his native city, where he gained experience that proved valuable in his later experiments. The following four years, he worked at other plants in Mannheim and Phorzheim, and then he established his own machine shop at Mannheim, in which he employed from six to eight men. It was while operating this shop that the idea of building a self-propelled vehicle took root in his mind.

In 1878, Dr. Benz (the honorary title of doctor was conferred upon him during the later years of his life) developed a two-stroke gasoline engine which gave sufficiently promising results to enable him to find a financial backer. This engine was put on the market in 1880, but Dr. Benz soon withdrew from the partnership and in 1883 organized a new firm for the manufacture of gas engines. Two years later, he built and demonstrated his first automobile, the machine already referred to, and shortly thereafter he developed a four-stroke gasoline engine.

In the original Benz three-wheeler, a photograph of which is shown herewith, the single-cylinder engine was arranged under the seat, and because of the large-diameter flywheel considered necessary, it was placed with the crankshaft vertical, the flywheel rotating in a horizontal plane. The engine with flywheel and all accessories weighed 165 lb. There was only a single speed reduction, but Benz soon found that to be able to climb the hills in the vicinity of Mannheim he would have to have an additional low-speed gear. The power of the engine, ¾ hp., also was found insufficient for operation on poor roads. Dr. Benz filed his first patent for an internal combustion engine motor vehicle on Jan. 29, 1886. Originally, he had thought of using coal gas as fuel, but he found this unsatisfactory and soon converted the engine to one capable of operating on liquid fuel.

In 1888, Emile Roger, who had a small workshop in Paris, contracted for the entire production of Benz cars and imported them into France. Because of French objection to favoring a German-made vehicle, M. Roger bought a number of parts and assembled a car of his own which he called the "Roger" automobile.

Benz was the first manufacturer to get into quantity production on automobiles, having turned out more than 2000 cars prior to 1900. Many of these were exported to England and France, and a few were brought to this country. Both a Benz and a Roger-Benz competed in the Times-Herald race held in Chicago on Thanksgiving Day, 1895, which was practically the starting point of automobile development in this country. The Benz, which was imported by the H. Muller Mfg. Co. of Decatur, Ill., won second place in the Times-Herald race and won a preliminary race from Chicago to Waukegan and back on Nov. 2, 1895.

Carl Benz demonstrating his first automobile in 1885

Color Option *Problems Solved by Production* Control

Hudson places burden of body color selection upon its dealers and makes the output schedule care for daily changes in requirements.

By Athel F. Denham

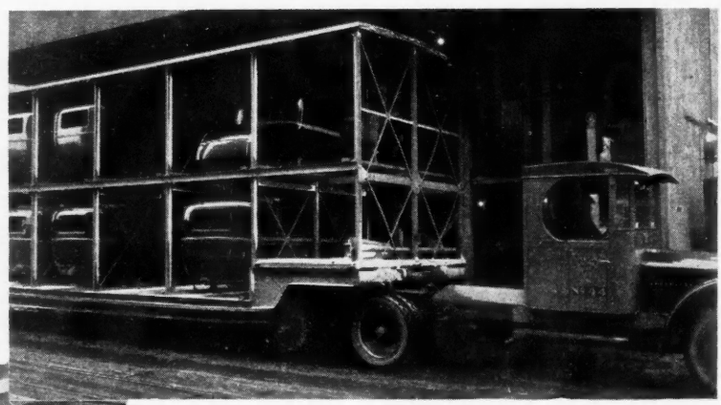
EVER since the custom of offering a number of color options on any given body model has been popularized in the automobile industry, mass production manufacturers have been faced with the problem of attempting to predetermine demand for each specific color. The larger the production, the more acute has the problem been. Frequent color changes have been made but no definite method of forecasting popular preference for any specific color or combinations of colors has been developed. Considerable of the difficulty, of course, is due to changes in the taste of the buying public. For instance, black was almost unsalable a few years ago. Today it is again in wide demand.

Assuming the hopelessness of predicting popular demand, the Hudson Motor Car Co. has attacked the problem from what is believed to be a new angle as far as mass production is concerned. The basis of the system is the lacquering of cars according to orders received. Thus, the problem of color selection is passed on directly to the indivdual dealer, who naturally is in a better position than the factory to gage the salability of any particular combination of colors in his territory. Lacquering of bodies in the Hudson-Essex plant, including the chassis and sheet metal parts, follows strictly the dealer's wishes.

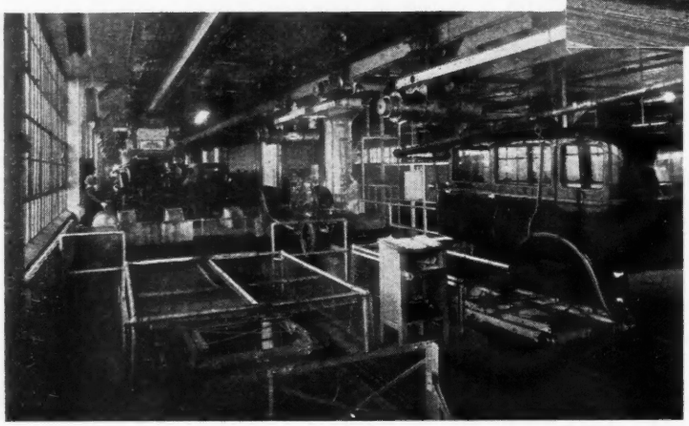
Application in practice of this general principle naturally entailed a production question for the Hudson Motor Car Company with its high daily output per sq. ft. of floor space, its policy of not carrying stocks of production parts in process, and its resultant requisite high parts inventory turnover of 20 times per year.

Broadly speaking, the individual problems which had to be solved in order to put such a plan in operation were about as follows:

1. Obtaining dealer's requirements according to body model and color combination.
2. Segregation and classification of these orders to fit into the production schedule.
3. Issuing of orders to all departments showing the different color jobs to be handled each day, and the order in which parts are to come through.
4. Synchronizing all color parts production lines to have corresponding colors arrive at the right place in the final assembly line at the right time.



Above—This interesting truck is used by Hudson for transporting bodies from the body plant to the trim line in the main plant. Quick loading, unloading and large carrying capacity (12 bodies) are a feature. Bodies are not removed from the hand trucks during transportation



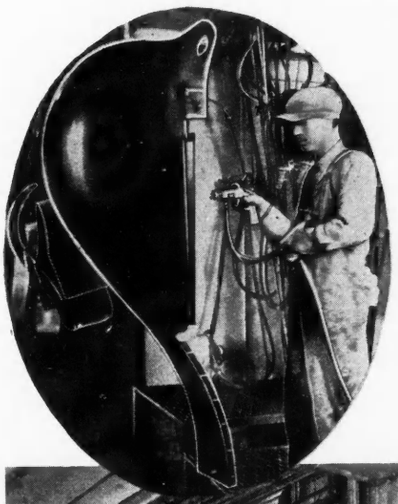
Left—In the Essex plant, the final assembly line is a continuation of the body trim line. Chassis are lifted up to the second floor by the electric traveling crane shown at the left, the right hand crane depositing the body in the chassis. Both travel on the same monorail of necessity and absolute synchronization is paramount

5. Provision to take care of any temporary tie-up in any one contributing production line.

6. Provision for inspection rejection of colored parts to prevent tie-ups.

7. Elimination of guesswork on the part of the spray booth operators.

The first problem was relatively simple. Dealers were furnished color charts, showing each body model of both Essex and Hudson lines in each color combination available, five for each body model. Each of these colors is assigned a letter of the alphabet, and the dealer's order blank has provision for stating the color of each car he wants by means of this letter. The major requirement is that these orders must be received at least three days before shipment can be made.

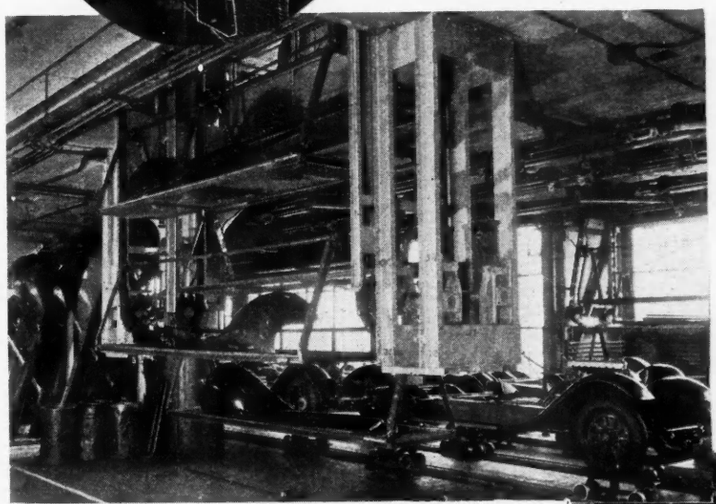


The necessity for this requirement is obvious after considering the second problem—that of converting sales department requisitions into production orders. Production by body types has to be determined a week or ten days in advance of final assembly. On the basis of dealer orders, the percentage figures for each type are set. Sales department requisitions then have to be broken down by the planning department to comply with these schedules and according to orders received, shipping distances, etc. This work is done for each day's production the preceding night between 7 and 11 p.m. Orders then go out to all departments and the stage is set for the next day's production before the day begins. The orders covering every one of the 1900 or so cars gives the complete details, order of routing, colors, etc.

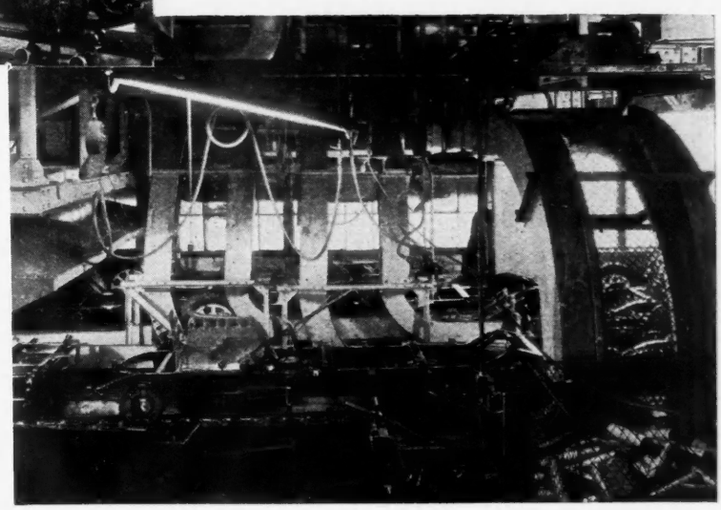
The third problem then had to be attacked, that of properly synchronizing all related lines and establishing an effective control system. Synchronizing the lines, of course, was purely mechanical and was taken care of by the time study department. All conveyor lines were synchronized exactly, because, on account of space limitations, no stock could be allowed to accumulate either on a conveyor or adjacent to the assembly line.

Since such a set-up lays itself open to an expensive shutdown in case anything goes wrong on any one line, the importance of a good control system became predominant. This was taken care of by the installation of a system of "teletype" machines, automatic electric reproducing typewriters, at strategic control points in the various lines. The foreman or inspector at these control points types a record of the number and kind of parts which have passed his point, the continuous record being reproduced on a ticker tape in the planning department offices. If a green fender is shy, or there are four too many yellow wheels, the planning department becomes aware thereof immediately through comparison of reports from key points with predetermined master schedules, and steps are taken to correct the situation.

While it has been stated that production parts in process are not carried in stock, there are small stocks of such parts at strategic points, maintained there to take care of any contingency similar to that just outlined. These compose an emergency reserve. This is not true of the body plant, however, which has to work several days ahead of final assembly and which carries a floating stock to permit slight switches in production schedules for individual body



Oval picture—In the various spray booths there is a spray nozzle and hose for each optional color, each designated by letter. Parts coming into the booth are also lettered, and the corresponding nozzle is used



Above—An example of synchronization is shown in this meeting of the chassis assembly and fender conveyor lines. Note that only an emergency stock is carried at the extreme left

Right—Another example of effective synchronization is found in the juncture of chassis and wheel conveyor lines. Corresponding colors have to arrive simultaneously

types. Incidentally, the body plant is some miles away from the final assembly line, and yet bodies must reach the line at the specified time. This made necessary the development of a body truck capable of quick loading and unloading, with a rather large carrying capacity. An illustration of this truck is shown herewith. In it can be seen the rails in each compartment on which ride the rollers of the individual body truck.

Bodies are transferred from the truck directly to conveyor lines, one on the first floor for Hudsons and one on the second for Essex models. No stocks are carried there. The main plant of the Hudson Motor Company was originally designed for the production of 200 cars per day and its present production of not far under 2000 indicates the reason for this.

One more problem had to be taken care of, that of error on the part of the spray booth operator in selecting the correct color. This was mastered by attaching the color "letter" to each chassis or body, etc. The operator merely uses the hose and spray gun corresponding to the letter on the part to be lacquered.

A point which might be brought out is the effect on this system of color style trends on the part of the purchasing public, as reflected through the dealer. Unpopularity of a given color is quickly indicated by the lack of orders for that color combination, and the idle lacquer pipe line and nozzle is supplied with a new color, new color illustrations being sent to dealers to replace the unpopular combination.

AN automobile dictionary in three languages, German English and French, has been compiled by Benno R. Dierfeld for the German Automobile Manufacturers Association (Reichsverband der Automobelindustrie) and is published by Dr. Ernst Valentin Verlag, Berlin-Friedenau. It contains some 16,000 expressions frequently used in the automobile industry, the trade and the sport, not all of which, of course, are technical expressions. These are arranged in three parallel columns. The work will be published in three volumes. In the first volume, the German terms occupy the first column and are arranged alphabetically, while in the following volumes the French and English terms will be arranged alphabetically. On the whole, the English equivalents given seem to be very good, though one might find fault with some of them.

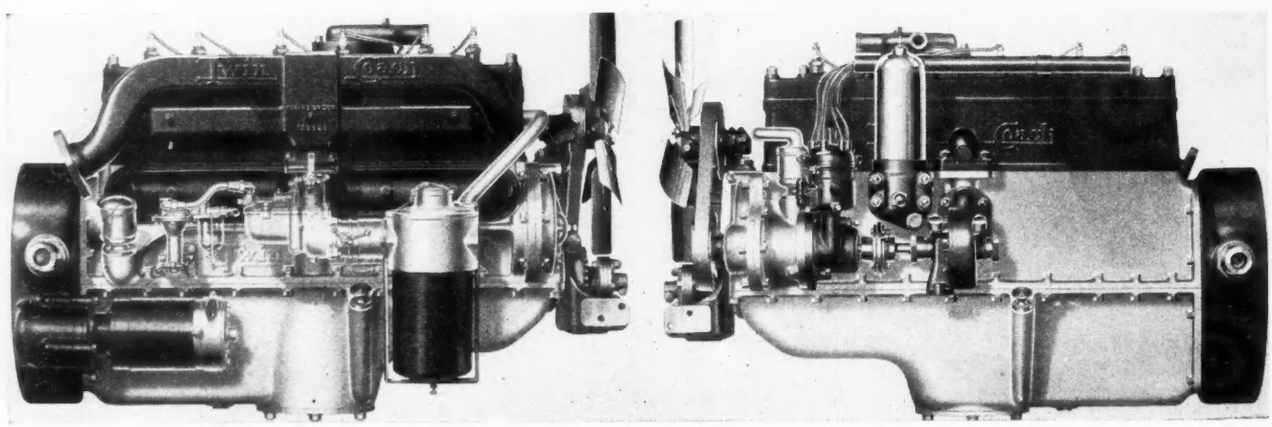
Hercules Manufactures Special Engine for Twin-Coach

ASIDE from its regular line of heavy duty four and six-cylinder engines, the Hercules Motors Corp., Canton, Ohio, also manufactures engines specially for the Twin-Coach Co., Kent, Ohio, of which Frank M. Fageol is president. These engines are built in two models, one with a bore of 3¾ and a stroke of 4½ in. (298.8 cu. in.); the other with a 4-in. bore and a 4½-in. stroke (339 cu. in.).

The cylinder block is cast of alloyed iron of high tensile strength, and the weight of the engines is kept down by the use of a separate aluminum crankcase. To secure the maximum rigidity obtainable with a separate crankcase, "through"-bolt construction is used. Sixteen of the main-bearing bolts extend through the crankcase and up through the cylinder block and cylinder head, holding these parts together. Fundamentally the design of the standard Hercules engine has been adhered to in the Twin-Coach engines.

The pistons are of Lynite alloy, of invar-strut design. There are four piston rings of the Perfect Circle type, all above the pin, the lowermost being an oil-regulating type. The piston pins are of nickel-molybdenum steel, 1⅛ in. in diameter. The crankshaft, of chrome-nickel steel, has seven main bearings all 2⅝ in. in diameter. Force feed lubrication is employed. Oil channels drilled in the crankcase lead oil to the main bearings, and from the latter it flows under pressure to the connecting rod bearings through drill holes in the crankshaft. Lubrication of the timing gears is also by force feed.

The camshaft is supported by four bearings, each 2⅛ in. in diameter. Inlet valves have a clear diameter of 1⅝ in., and exhaust valves of 1½ in. All Twin-Coach engines are equipped with AC fuel pumps built-in and driven off the camshaft. Accessories are conveniently mounted. The accessories shaft on the left side is supported in a 1 15/16 by 3½-in. bearing.



Twin-Coach engine with aluminum crankcase built by Hercules Motors Corp.

Chrysler Effects Plymouth *Changes* After *Moving Plant* Facilities

Stroke of the engine has been lengthened from 4⅛ to 4¼ in., thereby increasing the displacement from 170.3 to 175.4 cu. in. Redesigned crankshaft used.

WITH the removal of the entire manufacturing facilities of the Plymouth Motor Corp. to its new plant on Mt. Elliott Street, Detroit, a number of changes were put into effect in the car to obtain more power, provide greater serviceability and greater smoothness of operation.

The stroke of the engine has been increased from 4⅛ to 4¼ in., thereby increasing the displacement from 170.3 to 175.4 cu. in., and the crankshaft has been entirely redesigned. Crankshaft bearings are considerably larger in diameter, and are now of the interchangeable type. In addition to the bearing portions, the crank arms have been made considerably heavier, and the weight of the crankshaft has been increased almost 10 lb., being now 41 lb.

Crankpin diameters also have been increased for greater crankshaft rigidity, and connecting rods have been lengthened from 7⅞ to 8 13/16 in., which more than takes care of the longer stroke in reducing rod angularity. Complete bearing changes follow:

	New Diam.	New Length	Old Diam.	Old Length
Front main	2¼	2⅛	1⅞	2 13/32
Center main	2¼	1⅝	unchanged	
Rear main	2¼	2⅜	1⅞	2 13/16
Crankpin	2	1⅜	1⅞	1½

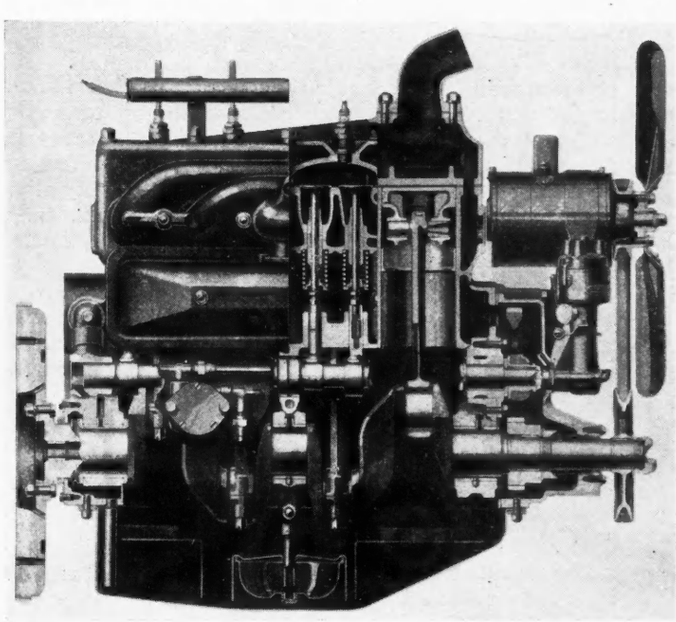
To keep the hot gases away from the front compartment and to insure more rapid cooling of the exhaust gases, the exhaust pipe is now carried down in front. The distributor, which was formerly mounted at an angle, is now mounted in a vertical position, which is said to result in more efficient operation and longer life.

Quite a number of improvements have been made in the lubrication system. In the first place, pressure lubrication is now carried to all three camshaft bearings. Next, a new type, bell-shaped, oil pump screen has been adopted, for more efficient straining. For better accessibility, the oil pressure relief valve has been located on the upper left crankcase, and the oil pan drain plug at the right side of the pan. Crankcase ventilation has been improved by changing the outlet pipe connection from the valve chamber to the left rear of the cylinder block at a lower point, connection with the crankcase being through a cored hole.

In the electrical system are found a new type of ignition switch and lock built into the coil. Minor improvements have been made in the carburetor, including an adjustment for the accelerator pump. A button type of accelerator pedal foot rest has been adopted, for greater driving comfort.

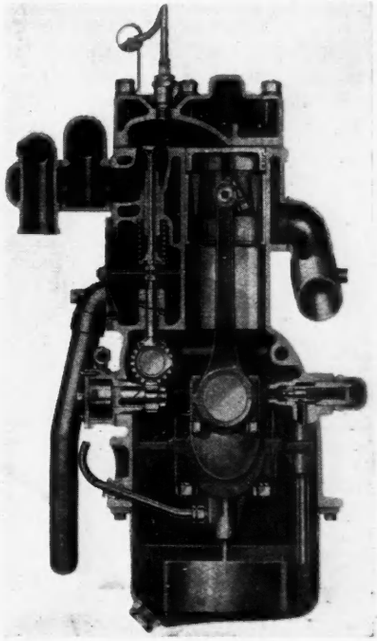
Increased accessibility for clutch parts has been provided by making the lower part of the clutch housing removable. Two changes have been made in the steering mechanism, a tubular drag link having replaced the solid one, for increased safety, and floating socket bearings having been adopted for the drag link ball joints, for better cushioning of the gear against road shocks.

New wheels with larger hubs and hub caps are more attractive than those formerly fitted, and also stronger.



On the left—A side view of the Plymouth engine, partly in section

On the right—A cross-section view of the Plymouth engine



Long Intake Pipes May Increase Engine *Output*

Phenomena in induction systems are similar to those in alternating current circuits, says Italian writer. Volumetric efficiency may be raised by connecting air reservoir to inlet pipe.

A RATHER novel conception of phenomena in engine intake systems has been put forward by an Italian writer, Antonio Capetti, whose article on the Effect of the Intake Pipe on the Volumetric Efficiency of an Internal Combustion Engine in *Annali della R. Scuola d'Ingeneria di Padova* has been translated for the National Advisory Committee for Aeronautics.

The author points out that the intake pipe is traversed by a pulsating current of combustible mixture, and that the phenomena of flow are quite similar to phenomena in alternating current electric circuits. Flow is induced by the displacement of the piston, which is an harmonic function, and the flow is a periodic function of the same frequency, but it lags behind the piston displacement in phase, owing to the inertia of the gaseous column.

As the piston starts on the suction stroke, it draws air behind it, but owing to the inertia of the air, this does not flow at first at a rate commensurate with the speed of the piston. As long as there is suction in the cylinder, the air expands on entering the intake system, and during this early part of the induction stroke the expansion wave travels backward through the inlet pipe away from the inlet valve. The condition described lasts until the front of the expansion wave has reached its limit. From this point on, a compression wave begins to penetrate the intake pipe and push air into the cylinder, this latter action continuing even after the piston has reached the bottom dead center and started on the return stroke.

It is obvious from the above that the initial retardation in the flow of charge may be offset by the succeeding inrush, and if the phase displacement of the flow reaches a specially favorable value, a supercharging effect may result from the effects of the inertia. Engine manufacturers are aware of this lag, and make allowance for it by closing the inlet valve after bottom dead center.

The best phase displacement is that with which the wave of maximum compression reaches the cylinder at the instant the volume of the latter is a maximum, that is, at the end of the suction stroke. The wave of maximum compression, however, is produced by a refraction

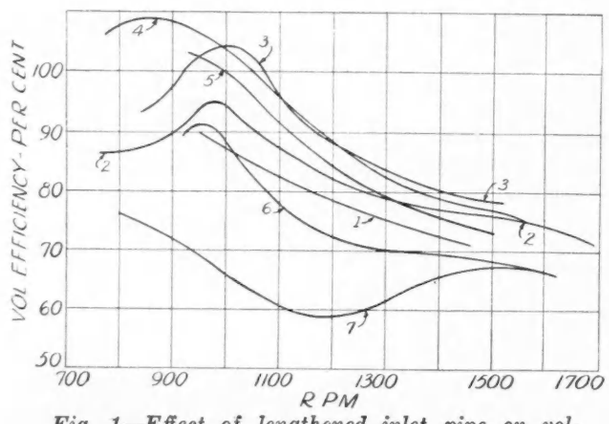


Fig. 1—Effect of lengthened inlet pipe on volumetric efficiency

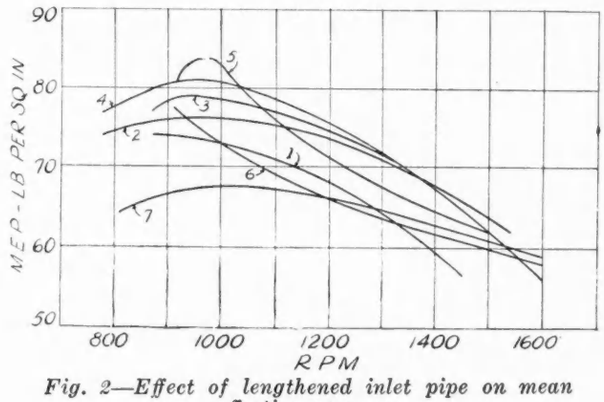


Fig. 2—Effect of lengthened inlet pipe on mean effective pressure

of the wave of maximum expansion, or, in other words, by the reaction to the maximum reduction of pressure, which leaves the cylinder when the suction stroke is about half completed, because the piston is then moving at its maximum speed. It is therefore necessary that the time required by the wave to traverse the inlet pipe twice, be equal to the time required for half a piston stroke.

If the mean velocity of propagation of the waves be denoted by w (velocity of sound) and the piston speed by v, the two time intervals to be equated are $2\ l/w$ and $c/2\ v$. Hence, the best ratio of pipe length to piston stroke is

$$l/c = w/4\ v$$

This relation may be expressed in different form by introducing the engine speed n in revolutions per minute, which is related to the mean piston speed v and the length of stroke c by the equation $v = n\ c/30$; this gives

$$l = 7.5\ w/n$$

This equation expresses the condition of resonance between the motion of the piston and vibrations of the

air column in the inlet pipe. The period of vibration of a tube open at one end is 4 l/w and the intake period is $30/n$. The equation last given shows that these two periods are equal. Thus the phase displacement is half a stroke, or 90 deg., as in resonance phenomena.

Assuming that w is 1100 ft. per second, the velocity of sound at 59 deg. F., the values given in the following table are obtained:

Table I

n =	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000 r.p.m.
l =	100	67	50.5	39.8	33.5	28.7	25.7	22.4	20.1 in.

These values are somewhat greater than those obtained in experiments, which is thought to be due to the fact that the velocity of the wave is not that of sound in

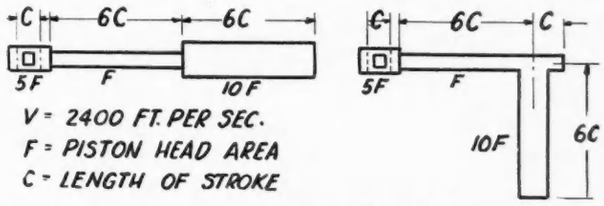


Fig. 3—Diagrams of inlet tracts with "capacity" in series and in parallel

still air, as the velocity of the medium in the direction of propagation must be added. If the velocity of flow is represented by u, the first time interval becomes

$$l\left(\frac{1}{w+u}+\frac{1}{w-u}\right)=\frac{2l}{w}\quad\frac{w^2}{w^2-u^2}$$

and the equation for the ratio of pipe length to length of stroke becomes

$$\frac{l}{c}=\frac{w}{4u}\quad\left(1-\frac{u^2}{w^2}\right)$$

In Table II the second line gives the required pipe length stroke ratios according to the equation first developed, while the third line gives the values obtained by the equation corrected for air flow velocity. The velocity u is taken at twice the mean value, for the reason that the waves of maximum expansion and compression are being propagated while the rate of air flow in the intake pipe is near its maximum value. For the mean value of u we must adopt the product of v by the ratio of the piston head area to the intake pipe area, which in the calculations has been taken as equal to 5.

Table II

n =	4	6	8	10	12	14	16	18
l/c =	21.2	14.2	10.6	8.5	7.1	6.1	5.3	4.7
l/c =	20.9	13.8	10.0	7.8	6.2	5.0	4.0	3.4

It has been found, however, that in calculating the volumetric efficiencies obtainable and the best inlet valve closing lag, the dead gases remaining in the cylinder cannot be neglected. The fact that the pressure of these dead gases at the beginning of the inlet stroke is above atmospheric, does not affect the best ratio of inlet pipe length to length of stroke, but their higher temperature reduces this ratio. Account must be taken also of the frictional resistance to air flow of the inlet pipe. From the standpoint of frictional resistance alone, a short and large diameter pipe would be best.

Obviously, when a single intake pipe supplies a number of cylinders, the best ratio of pipe length to length of stroke is changed. The above theoretical discussion is based on the assumption that when the inlet valve opens, the pressure in the inlet pipe is atmospheric; this assumption is justified in the case of a single cylinder engine, because the inlet stroke is there preceded by three other strokes, during which the pipe is shut off from the cylinder; and during this time any pulsations in the pipe when the inlet valve closed have had time to be damped out. When the same inlet pipe supplies two, four or six cylinders, there is not sufficient time between suction strokes to damp out the impulses; the phenomena are greatly complicated, and it is difficult to predict exactly what will happen, but it is reasonable to assume that the superchanging effect obtainable from the inertia of the gas column is diminished.

Tests made by the author on a four-cylinder automobile engine showed definitely that if such an engine is supplied through a single inlet pipe, lengthening the pipe will increase the power up to a certain point. To be specific, by using pipe lengths of 33.5, 43, 47 and 59 in. (corresponding respectively to 6, 8, 8.6 and 11 piston stroke lengths, the piston speeds of 1400, 1200, 1000 and 800 ft. p.m., the increases in volumetric efficiency were 8.5, 10.5, 19.5 and 24 per cent, respectively. The possibility of supercharging by inertia was thus demonstrated.

Very Long Pipes Show Advantages

In Figs. 1 and 2 the volumetric efficiency and the m.e.p. of an engine are plotted against its r.p.m., and these graphs also show plainly that an advantage can be gained up to a certain point by increasing the length of the intake pipe. Curve VI, for instance, corresponds to an intake pipe length equal to 22 times the length of stroke. For speeds above 1300 r.p.m. very long pipes showed advantages. The maximum gain in m.e.p., and hence in the engine power, was 11 per cent. This is less than the maximum gain in volumetric efficiency, which proves (the author observes) that supercharging is not accomplished without the expenditure of power.

The inertia of the gaseous column, the effects of which have been described in the foregoing, correspond to inductance in electric circuits, both of these producing a lag in the flow with respect to the phase of the flow-producing force. In electric circuits the effects of inductance can be modified and neutralized by the use of capacity either in parallel or in series with the inductance, and Signor Capetti endeavored to produce a similar effect in the induction system of internal combustion engines. Capacity in series is represented by a pipe of larger internal diameter at the beginning of the induction system, while capacity in parallel is rep-

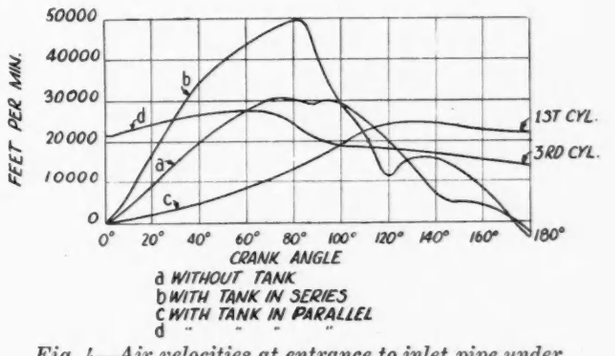


Fig. 4—Air velocities at entrance to inlet pipe under different conditions

(The curves in Figs. 1 and 2 were obtained with pipes of the following lengths added to the regular inlet pipe: 1, 0.0; 2, 13.8 in.; 3, 36.6 in.; 4, 58.3 in.; 5, 63.7 in.; 6, 102 in. and 7, 154 in.

resented by an air reservoir communicating with the induction system (Fig. 3).

It was found that a large diameter pipe forming an extension of the regular inlet pipe in general has no beneficial effects. Under most conditions such a capacity reduces the volumetric efficiency. With a reservoir connected to the inlet pipe near its beginning, the effect on the volumetric efficiency also is small, but it is opposite in sign to that in the previous case. The effect of capacity in parallel to the velocity of air flow into the inlet pipe is very marked, see Fig. 4. In Fig. 4 curves *c* and *d* represent calculated results for velocity of air flow for the first cylinder and the third cylinder.

That a supercharging effect may be produced in engine cylinders by making the inlet pipe of a definite length had been shown previously by experiments made in this country by the National Advisory Committee for Aeronautics (Robertson Matthews and Robert W. Gardiner, Increasing the Compression Pressure of an Engine by Using a Long Intake Pipe, N. A. C. A. Technical Note No. 180, 1924), this paper being referred to by Signor Capetti.

Number of Balloon Tire Sizes Increased Last Year

TWENTY-EIGHT different sizes of low-pressure tires are in use on the passenger cars coming from the factories today as against 22 distinct sizes a year ago. This direct comparison of current practice with that of 12 months ago bears out clearly the general contention of the article about balloon tire standardization which appeared in the March 16 issue of *Automotive Industries;* namely, that progress toward simplification has not been made, despite serious conversation about standardization.

No mention was made in the March 16 article of the adoption by the S. A. E. of a series of low-pressure tire and rim sizes at the summer meeting in Montreal last year, this standard being later ratified by letter ballot and incorporated in a supplement to the Handbook issued in last September. Up to that time the S. A. E. had had merely a Recommended Practice for rims for use with low-pressure tires. This list of rims included six sizes and, according to the information supplied, they were adapted to take ten different sizes of tires. At the November, 1927, meeting in Detroit, referred to in our article, and at the annual meeting a few months later, the discussions centered around these lists.

In view of the large number of different sizes of balloon tires then in use, it may have seemed very optimistic to get makers to abide by this rather small number of sizes. On the other hand, when it is considered that in 1918 the society adopted a list of seven sizes of pneumatic tires covering a range sufficient for both passenger car and commercial vehicle requirements at that time, it did not seem utopian.

The results of action by a standardizing body can be judged only after a definite time has elapsed. Makers do not change their designs immediately a new standard is published. In fact, most car manufacturers make important changes only once a year, and at that time they may reasonably be expected to give due consideration to the adoption of any new standards that have been promulgated in the course of the year. Thus, one must wait at least a year after a standard is published before one may expect it to show any definite influence on design. It was on this basis that the effect of the S. A. E. Practice on Rims for low-pressure tires was investigated for the article published March 16.

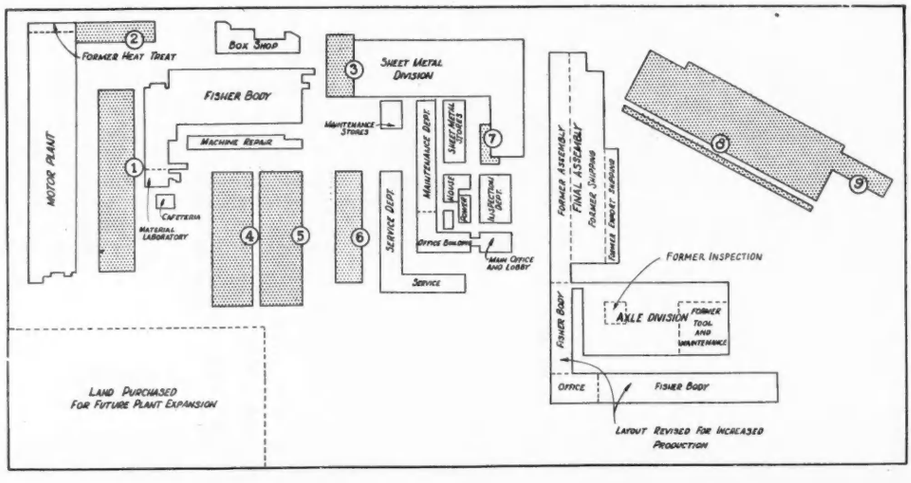
The new list adopted by the S. A. E. last summer contains three additional sizes of rims. Ordinarily, the object of standardization is to reduce the number of sizes in use, and if the Tire and Rim Division added three new sizes to the six which it had recommended the previous year, the reason must have been that the division saw that the earlier list was not sufficient and that the tendency of car makers was away from it rather than toward it, as was pointed out in our article of March 16.

What the effect of the new standard will be we will have to wait a year to see. Naturally, as a result of the increased list, it will cover a much larger percentage of the total production.

Showing Oldsmobile's Plant Expansion

Key to new Oldsmobile buildings shown in the accompanying plan.

1. *New motor plant, now being equipped.*
2. *Addition to present heat treat building.*
3. *Addition to present sheet metal building.*
4. *New export and production building.*
5. *New tool and maintenance building.*
6. *New engineering laboratories building.*
7. *Addition to present enameling building.*
8. *New warehouse and loading docks.*
9. *New driveaway.*



Just Among Ourselves

Chemical Cooling—Its Effects or Design

CONCLUSION of successful tests by the War Department with a new cooling medium as a substitute for water in conventional water-cooled types of airplane engines should mean material reduction in weight, lowered wind resistance of radiator and increased thermal efficiency with greater unit power output, provided of course that the higher boiling point of 387 deg. Fahrenheit for this new fluid and consequent higher normal operating temperatures does not seriously affect piston, bearing and other clearances. However, with minor alterations in design and manufacture, objections from this angle can seemingly be overcome. If this cooling medium can be made available commercially, we may look for modifications in automobile design such as smaller radiators, or increased cooling capacity from existing sizes and types. At any rate, the statement of the always conservative War Department relative to its success with this new medium should be of more than passing interest. (This from E. B. Neil, chief engineer to this department.)

* * *

Better Foreign Roads Mean More Sales

CONTINUANCE of highway development throughout the world adds just another fact to support the theory of rapid expansion of foreign automobile markets during the second and remaining quarters of 1929. Many thousands of miles of new highway mileage are being added this year to the 2,007,270 miles which existed outside of the United States at the end of 1928. Chile, for example, is expected to complete this year $2,696,122 worth of the $6,013,095 worth of contracts for new roads awarded last year, while new contracts to be awarded this year will be for $5,373,126, according to *Commerce Reports*. Slow, though steady, road building progress is going forward in the Foochow district of China, and in scores of other areas in all parts of the world similar steady progress is being made.

* * *

"Youth is Not a Time of Life . . .

WE wish every editor in the world would quote this prominently in his paper" says a brief note in the *Harris-Dibble Bulletin* following an editorial about "Youth" which it reprints from the *International Paper Monthly*. We're glad to cooperate. Here it is:

Youth

YOUTH is not a time of life—it is a state of mind. . . . It is a temper of the will, a quality of the imagination, a vigor of the emotions. It is a freshness of the deep springs of life. Youth means a predominance of courage over timidity, of the appetite of adventure over love of ease. This often exists in a man of fifty more than in a boy of twenty. Nobody grows old by merely living a number of years. People grow old by deserting their ideals. . . .

"Whether seventy or sixteen, there is in every being's heart the love of wonder, the amazement at the stars and the starlike things and thoughts, the undaunted challenge of events, the unfailing childlike appetite for what next, and the joy and the game of life. You are as young as your faith, as old as your doubt; as young as your self-confidence, as old as your fear; as young as your hope, as old as your despair. In the central place of your heart there is a wireless station. So long as it receives messages of beauty, hope, cheer, grandeur, courage, and power from the earth, from men, and from the infinite, so long are you young."

What of Bodies on Front-Wheel Drive Cars?

WHATEVER a good many men in the industry may think today, we predict that those manufacturers and body designers who already are thinking of radically new body lines which would be made possible through somewhat widespread adoption of the front-wheel drive are not wasting their time. That there will be one front-wheel drive car publicly announced in the near future is common knowledge in the industry today. While chief interest in this first American front-wheel drive stock car naturally will center on the chassis, its body will get some very real study and attention from designers in the industry as well as from the general public.

* * *

May be Chance for Something Really New

THE front-wheel drive construction opens up new body design possibilities. It is not too early to start to work actively to analyze in detail the artistic possibilities made technically practicable by use of this new chassis construction. For unless our guess is very wide of the mark, there will be many more than two front-wheel drive stock cars on the American market within the next five years. The body developments should go hand-in-hand with the chassis trends. It would be too bad if body designers, when radical chassis changes of this kind came about, simply worked to see how conventional design could be adapted to it. Rather, it would seem, such a change might be viewed as the greatest opportunity offered in many years to body designers to develop a new school or a definitely different basis for their art.—N G. S.

Lubricating Oil *Specifications* Said for *Car* Users and Designers

Such data are useful chiefly to refiners, Metropolitan Section is told by George A. Round, of the Vacuum Oil Company, who cites instances and quotes handbook.

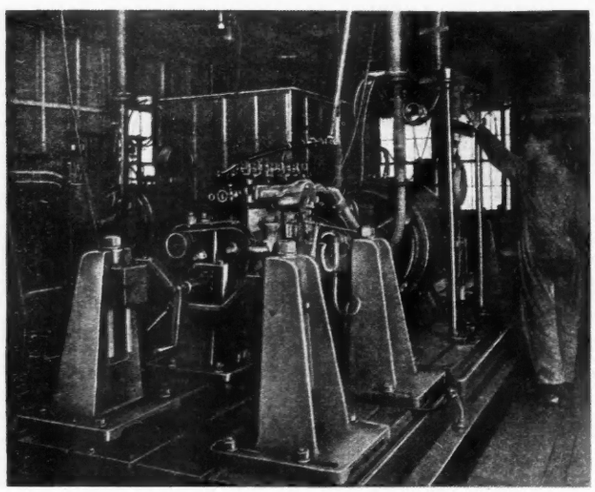
THE value of lubricating oil specifications to refiners and their lack of value to users and designers of automotive vehicles was shown by George A. Round, of the Vacuum Oil Co., at the March meeting of the Metropolitan Section of the Society of Automotive Engineers.

So that no one would feel that what was said represented personal opinion of the conclusions of one lubricating company, Mr. Round quoted from the booklet, "The Significance of Tests for Petroleum Products," published by the American Society for Testing Materials. He read in part:

"Gravity is of importance in the control of refinery operations. Gravity is of little significance as an index of the quality or usefulness of a finished product and its use in specifications is to be avoided."

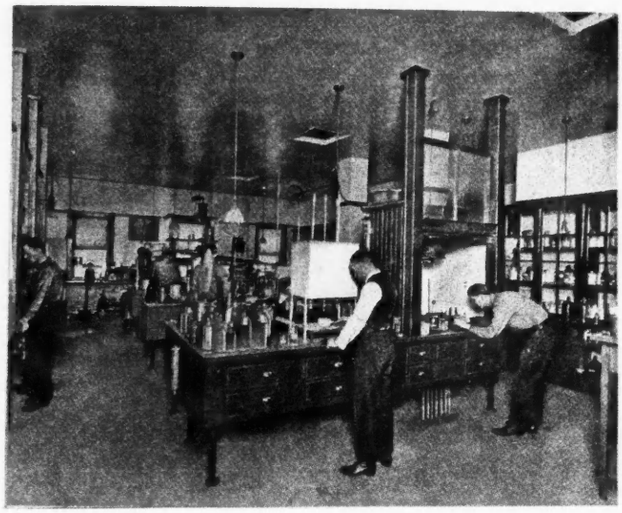
"Pour point gives an indication of the temperature below which it may not be possible to pour . . . oil from its container, or below which it might be dangerous to use the oil in a gravity lubricating system. . . . However, it should be borne in mind that the size and shape of the container, the head or force upon the oil, and the nature of its physical structure when solidified, all have an effect upon its tendency to flow.

"Consequently, pour points should be interpreted in the light of actual performance under the particular conditions of use.



A laboratory in which actual tests are made to determine the properties required of lubricating oils by certain engines

". . . it may be said that the flash point of a lubricating oil bears no direct relation to its usefulness. Flash points are useful to refiners in controlling the manufacturing process. Existing methods for determining the actual usefulness or value in lubricating oil are not



The chemical laboratory of a refinery, which is its nerve center. Here, a check is made of every step in the processing

satisfactory and in general it may be stated that the use of flash point is actually a makeshift to compensate for a large factor of ignorance.

"Fire point . . . adds little to the information that can be obtained from flash point figures."

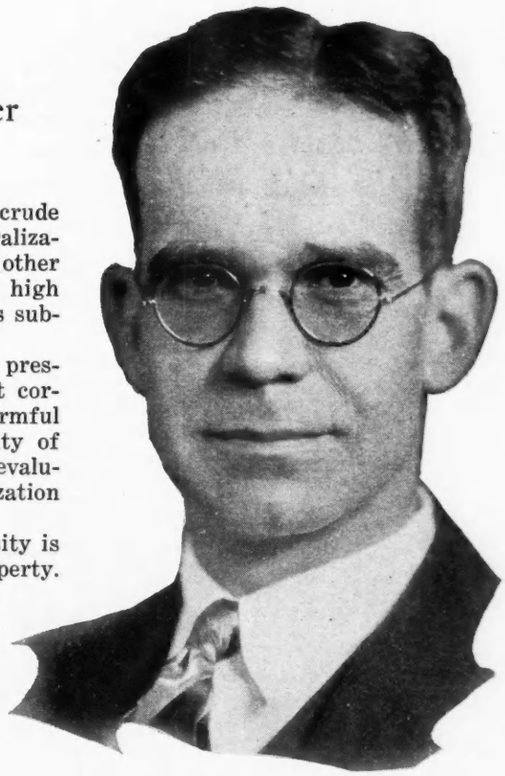
"The carbon residue test was originally developed for comparison of the carbon-forming properties of lubricating oils for internal combustion engines. It is frequently claimed that the quantity of carbon deposited in cylinders and on pistons is proportional to the carbon residue of the oil. Under ideal conditions this is probably true, but with average operating conditions, other factors such as the viscosity of the oil, the mechanical condition of the engine and the conditions of carburetion of the fuel, may dominate in controlling carbon deposition."

"Many people," said Mr. Round, "are interested in the acidity of a lubricating oil, trying to judge its value on that basis." So from the booklet previously quoted, he read:

to *Lack Value*

By

C. Edward Packer



George A. Round, assistant chief, engineering division, automotive department, Vacuum Oil Co.

"Oils derived from certain crude oils commonly show low neutralization numbers while oils from other crude oils show relatively high neutralization numbers, unless subjected to special processes.

"The organic acids normally present in lubricating oil are not corrosive and have no directly harmful effects . . . the general quality of a lubricating oil cannot be evaluated in terms of its neutralization number.

"For lubricating oils, viscosity is the most important single property. In a bearing operating properly, with a fluid film separating the surfaces, the viscosity of the oil at the operating temperature is the property which determines the bearing friction, heat generation, and the rate of flow under given conditions of load, speed, and bearing design. The oil should be viscous enough to maintain a fluid film between the bearing surfaces, in spite of the pressure tending to squeeze it out. While a reasonable factor of safety is essential, excessive viscosity means unnecessary friction and heat generation.

"Color requirements for lubricating oil are frequently over-emphasized as color does not necessarily indicate quality. A fallacy among consumers is that pale color indicates low viscosity."

Tangible proof of the commercial value of these findings was pointed out by Mr. Round when he mentioned that the experience of the United States Army in buying oil on government specifications was very unsatisfactory. He further mentioned that the Ordnance Advisory Committee sometime ago at a meeting reported so much trouble in operation of equipment on Government specification oils that it was decided to set up an approved list of lubricants and purchase from that wherever possible. The approved list includes those lubricants that have proved their worth in service regardless of specifications.

Similarly, it was pointed out, New York State after buying oils for two years on specifications has gone to an approved list, ignoring specifications.

Also, the Navy Department, with all its facilities for testing materials, uses specifications only for checking uniformity of lubricants, but uses what they term "the work-factor method" for judging oil value.

"Factors governing oil performance, as I see them," said Mr. Round, "are viscosity, or body and character; oiliness; gumming tendencies; oxidation rate; evaporation rate; carbonizing tendencies; and consistency at low temperatures.

"Viscosity, as was mentioned before, is probably the most important single factor as it determines and controls the load carrying ability of a bearing. There has been a tendency of late to go to oils of too heavy body. This reduces power output in most cases. Some feel that a heavier oil gives a lower consumption than a lighter oil, but high oil consumption is generally the direct result of incorrect mechanical conditions that should be attended to."

Mr. Round went on to show how the oil refiners are vitally interested in producing and selecting oils that satisfy the requirements laid down in the preceding paragraph, in order that the oils will give the best possible results in the different engines on the market.

Dr. J. C. Geniesse, of the Atlantic Refining Co., agreed fully with the remarks of Mr. Round and emphasized the fact that according to his experience it was much better to change oil consumption of an engine by changing the characteristics of the engine rather than by changing the specification of the oil.

Dr. Becker, of the Standard Oil Co. of New Jersey, and H. E. Pengilly, of the Standard Oil Co. of New York, both approved the remarks of Mr. Round. Dr. Becker mentioned that his company is at present making a number of oil consumption tests. The point stressed by Mr. Pengilly was that from his experience he had found some oils that would result in a 15 per cent fuel economy by reason of their superior lubricating quality and suitability for the engine concerned.

Research by the Vacuum Oil Company substantiates the remarks of Mr. Pangilly. In their records are instances of truck operators saving sufficient on their gasoline bill by having correct lubrication to more than pay the difference between an unsuitable oil and an oil that is exactly suited to the engine in which it is being used.

W. H. Conant, of the J. G. White Management Corp., oil distributors in New York, was invited by the meeting chairman, Mr. Dresser, to add his comments to what Mr. Round had said.

Mr. Conant was emphatic in approving of all that had been said by the other speakers. He added that there seemed to be something contagious about oil specifications; that municipalities, organizations, and even individuals are inclined to buy oil on specifications, to their loss.

"Frequently," he said, "we find some one demanding a certain specification that does not improve the oil but merely increases its cost. The oil man can produce whatever is required, but the consumer must pay the bill. Motor vehicle operators, and automotive engineers, for that matter, in many cases have come to love specifications not wisely but too well."

Milling Angle Pads on Cylinder Blocks As One Manufacturer *Does It*

A conveyor system brings the blocks directly to the machine, leaving to the operator only the task of clamping the work in position and controlling the action of the cutter.

THE accompanying illustrations show an interesting machine set-up employed by a well-known maker for milling angle pads on cylinder blocks. A conveyor system brings the blocks directly to the machine—a Cincinnati miller—leaving to the operator only the task of clamping the work in position and controlling the action of the cutter.

A special fixture is provided to hold one cylinder block on the machine table. The work rests upon a previously finished face, and the fixture is arranged so that the cylinder block may be slid into place on rollers and located by two disappearing dowel pins—one in each end of the block, near the operator. A guide block extends the full length of the fixture and rests against the lower inside bearing of the block. It is used to keep the work from running against the cutter while the work is being placed in the fixture.

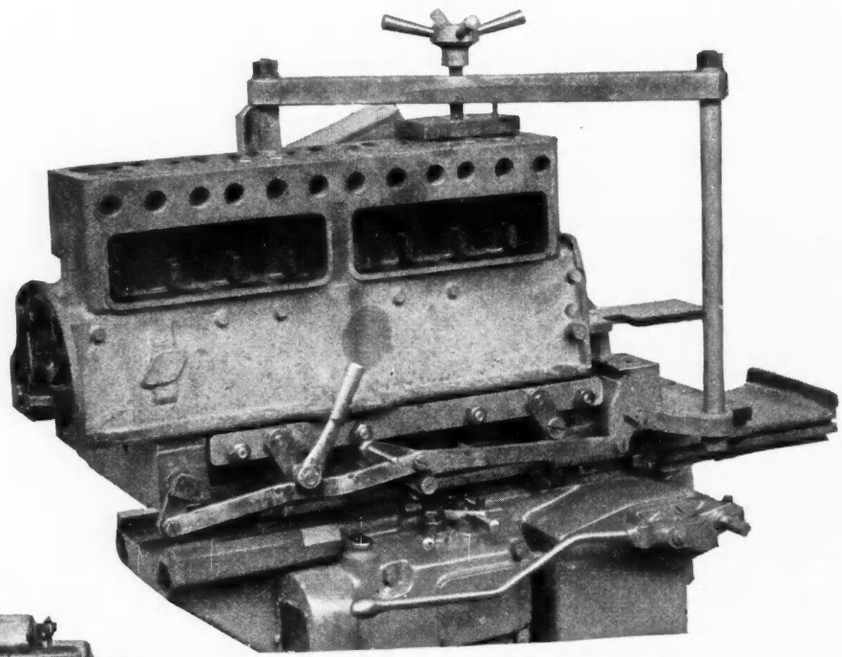


Fig. 2 (above)—Detail of set-up showing dogs which control table travel automatically

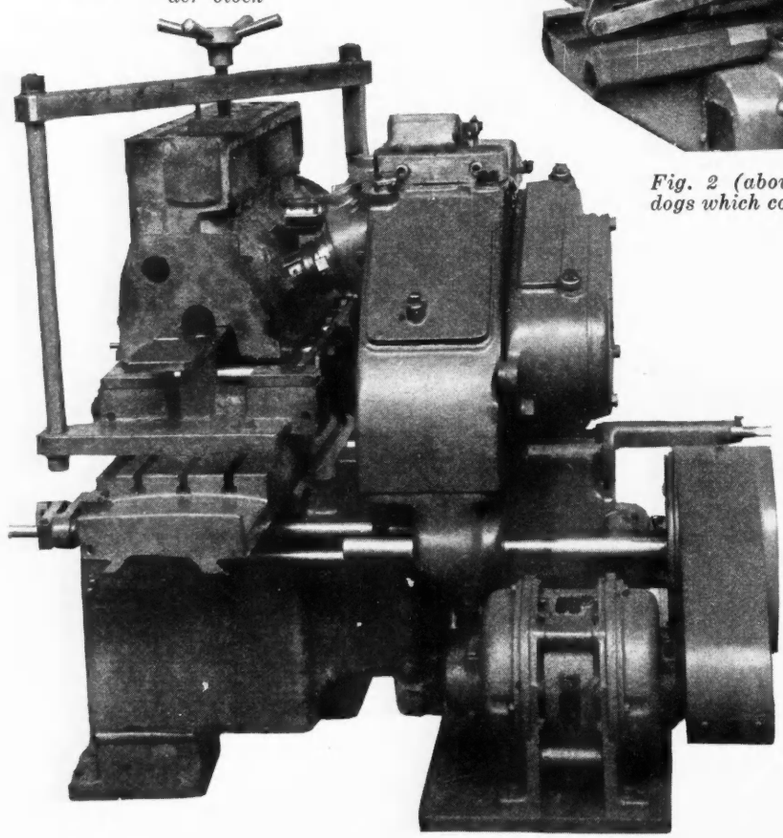
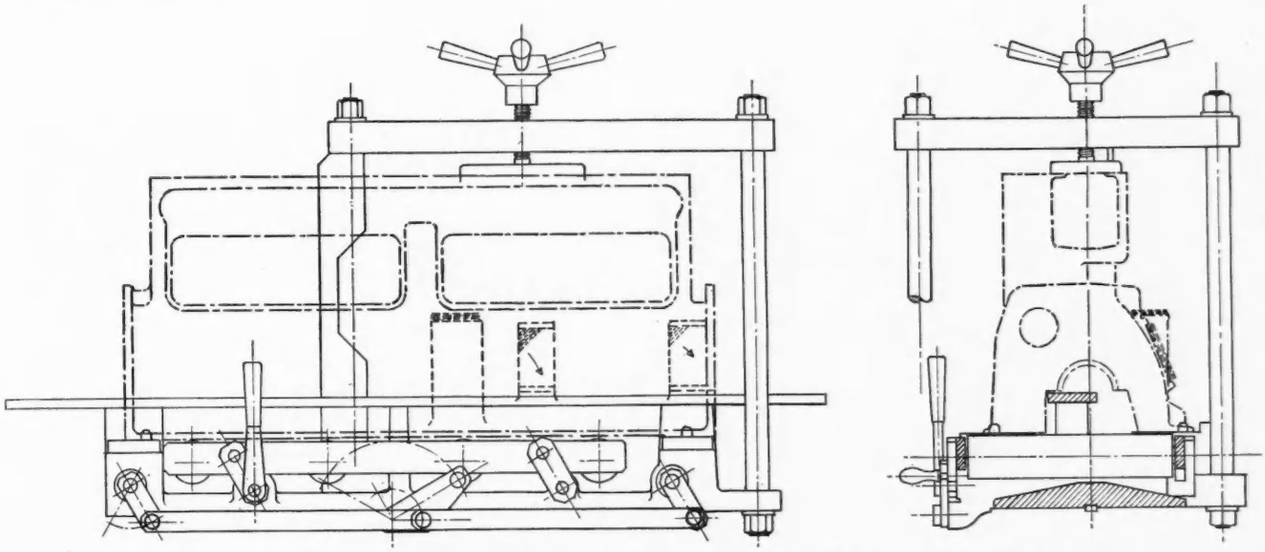


Fig. 1 (below)—Machine set-up for milling pads on cylinder block

After the work has been located, the rollers and dowel pins disappear, permitting the block to rest upon the supporting pads at each end of the fixture. The block is then clamped over the top by a quick-acting pilot wheel.

Two cutters are used, as shown in Fig. 1, one 4 in. in diameter and one 3 in. in diameter, revolving at 72 and 90 r.p.m., respectively. Each cutter removes 3/16 in. stock from the cast iron cylinder block, working on the angle pads and horizontal pad. The table feed operates at a rate of 7.74 in. per min., giving a



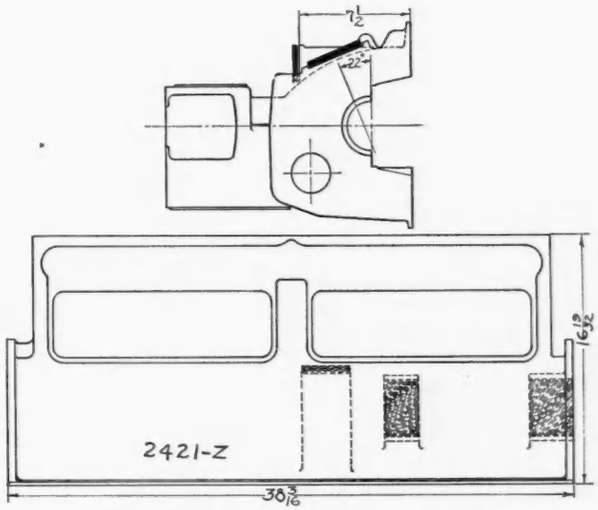
Above are two views of the fixture locating pins and method of damping. Below is shown the work to be machined

minimum time per piece of 1.55 min. Allowing for normal delays in shop production, an output of 38 pieces per hour is obtained.

The machine employed is standard except for special spindle carriers and special fixture.

In Fig. 2 are shown the dogs which automatically control the movement of the table and make it unnecessary for the operator to give any attention to that factor.

On this page are shown two views of the fixture and two of the cylinder block. The one above shows the rollers which are a part of the fixture and tie it up with the mechanical handling system. The two disappearing dowel pins used to locate the block are also shown. Note the guide block which prevents the work from running against the cutter while it is being placed in position.



Value of Different Metals for Headlight Plating

AN investigation of the reflecting power of polished surfaces of various metals has been conducted at the Bureau of Standards with a view to determining the suitability of the metals for plating reflectors. An account of the work was given in Research Paper No. 39 on "Reflecting Power of Beryllium, Chromium and Several Other Metals," by W. W. Coblentz.

The metals examined with respect to their reflecting power included beryllium, chromium, cobalt, nickel, silver, speculum, stellite and stainless steel. For chromium and beryllium, the investigation was extended into the infra-red region of the spectrum. The experiments showed that, contrary to general experience with other metals, beryllium has a high reflectivity in the ultra-violet range (for wave lengths of 250 millimicrons), followed by an appreciably lower reflectivity, with a minimum of 46 per cent at about 400 millimicrons in the visible spectrum.

Chromium has a higher reflectivity than nickel in the ultra-violet range and is, therefore, the more efficient as a reflector of ultra-violet radiation. Its maximum reflectivity, at 470 millimicrons, is very high, and is followed by a wide flat minimum range which extends from about 600 millimicrons in the orange, to beyond 2000 millimicrons in the infra-red range.

No definite conclusions as to the relative merits of the different metals for headlight reflector coatings were stated, except that from the standpoint of reflectivity, chromium is more useful than nickel in the ultra-violet. When one considers the fact that nickel tarnishes readily while a chromium surface is not easily affected, there is probably no great advantage in using nickel as a reflector. The investigation also indicated that ultra-violet radiation has little effect upon the disintegration and consequent lowering of the ultra-violet reflecting power of chromium.

Radial *Engine Cowling* Increases Recent *Tests* Indicate

Designers are apprehensive about effects of the appliance on the cooling system. Public attention first was attracted by the record Lockheed-Vega flight.

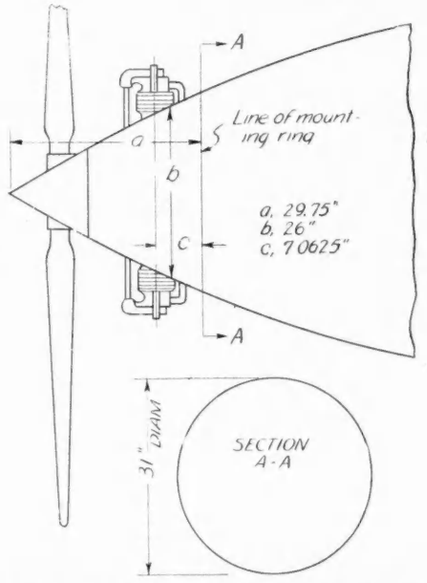
By HERBERT CHASE

DESPITE their well-recognized advantages and splendid performance records, radial aircraft engines always have faced the handicap of what is generally supposed to be a greater parasite resistance or drag than that inherent in other types with cylinders arranged in line or in banks. To be sure, water-cooled engines must have radiators, which usually offer considerable drag, but these radiators can be built into the wings, or be so designed and placed as to make their drag negligible.

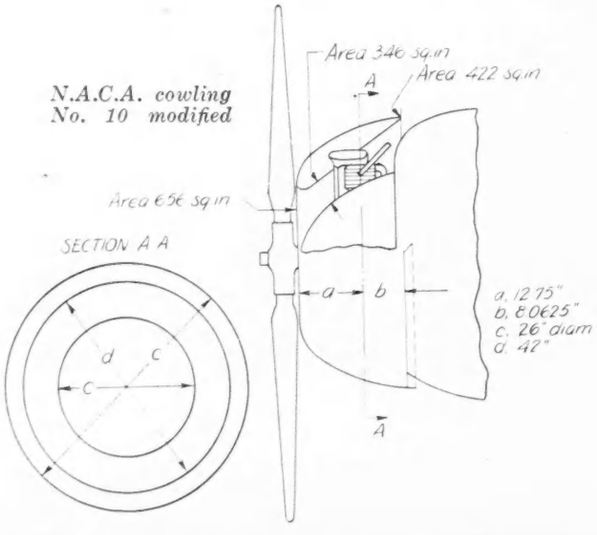
What appears to have been overlooked by many engineers, however, is the probability that, with suitable cowling, a very material reduction in drag might be effected with the radial engine and still provide adequate cooling when the engine is of the air-cooled type. An investigation of the subject was undertaken by the well-equipped laboratory of the National Advisory Committee for Aeronautics.

Two reports, written by Fred A. Weick, have been issued by this laboratory recently, and the results which they set forth have occasioned considerable comment in aeronautic circles. The more important conclusions reached in these reports may be summarized as follows:

There was practically no change in propulsive efficiency with the various cowlings used, but the drag of the cabin fuselage with the engine uncowled was found to be over three times as great as that under the ideal condition with the engine removed and nose rounded. Conventional cowlings, which leave the tops of the cylinder heads and the valve gear exposed to the air stream, effect some reduction in drag, but a cowling covering almost the entire engine, yet seeming to permit of satisfactory cooling, reduces the drag 2.6 times as much as the best of the conventional cowlings.



N.A.C.A. cowling No. 6



N.A.C.A. cowling No. 10 modified

Thus, the tests showed that the fuselage with uncowled engine produced a drag of 125 lb. at 100 m.p.h., while the best of the conventional cowlings with which cooling was adequate reduced the drag under the same conditions by 19 lb. as against a reduction of 50 lb. in the case of the cowling (known as No. 10) which covered the engine.

The results are also stated in another form in the report: "The drag of the bare fuselage without engine is only 40 lb. at 100 m.p.h. When the uncowled engine is placed on the nose, the drag is increased to 125 lb. or 3.13 times that of the bare fuselage without engine. With the best conventional cowling, the drag is 106 lb. or 2.65 times that of the fuselage alone, and with the cowling totally enclosing the engine the drag is 75 lb. or 1.87 times that of the fuselage without engine.

Airplane Speed

"The forms of cowling most used in service . . . have a very slight effect on the drag and hence an insignificant effect upon the performance of an airplane. The reduction of drag is small even when practically the whole of the cylinders is cowled in. Apparently, if even a small portion of the engine is exposed, it is sufficient to disturb the smooth flow over the body, and the turbulent flow is associated with high drag. When the entire engine is covered and the cooling air is separated from and returned to the outside air smoothly . . . the smoother flow is evidently accompanied by a substantial decrease in drag."

What would be the effect of these cowlings on performance? Calculations contained in the reports give the following results: Assuming that with the engine uncowled 200 hp. is required to fly horizontally at 125 m.p.h., then a conventional cowling similar to No. 6 would reduce the power required to 194 hp., No. 8, the best of the conventional forms, to 187 hp. and the cowling covering the entire engine to 167 hp. If the full 200 hp. were used, a cowling similar to No. 6 (with spinner) would result in a speed increase of less than 1 m.p.h.; one similar to No. 8, about 3 m.p.h. and one similar to No. 10, about 8 m.p.h.

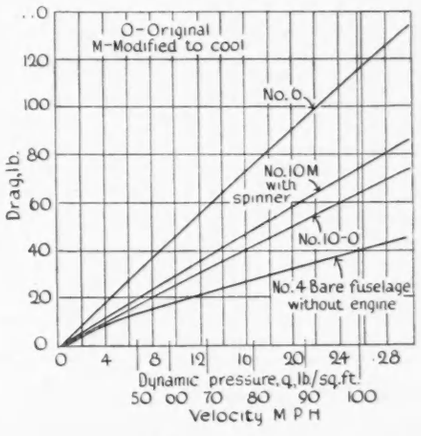
It was found that a propeller spinner such as is used on radial engines has an almost negligible effect upon performance.

The tests referred to were made in the propeller research tunnel at the N.A.C.A. Langley Field laboratory. This tunnel is of the open throat type with an air stream 20 ft. in diameter in which velocities up to 100 m.p.h. are attainable. The engine employed was a standard Wright "Whirlwind" J-5 capable of delivering 200 hp. at 1800 r.p.m., while the cabin fuselage was designed to have a shape approximating the average of several cabin monoplanes using this engine.

Following the test in the laboratory, a No. 10 cowling was installed on a Curtiss AT-5A airplane which, without this cowling, was known to have a maximum speed of 118 m.p.h. at an engine speed of 1900 r.p.m. With the new cowling in place, this plane attained a maximum speed of 137 m.p.h., or an increase of 19 m.p.h. The report on this flight test made by Thomas Carroll states that, "While the type of cowling as normally installed on an AT-5 is not particularly adaptable to speed, the increase is remarkable. Furthermore, the improvement of flying qualities in smoothness of operation was also very favorably commented upon by all pilots who have flown it. The air flow over the fuselage and over the tail surfaces is very obviously improved.

"The cooling of the engine was found to be normal in these tests. The oil temperature reached 58 deg. and was fairly constant, and there was no other indication of overheating. Likewise there was no interference to the pilot's vision in any useful field."

Prior to the wind tunnel tests for drag, the engine was tested at 60, 80 and 100 m.p.h. air speed to determine whether the cooling was satisfactory, numerous thermo-couples being inserted at various points about the cylinders to record temperatures attained. According to the report, "if the cooling with any cowling was not as satisfactory as that with the uncowled engine, the cowling was modified until satisfactory," the comparison being made in each case with temperatures attained with the uncowled engine. Inspection of the tabulated results of the temperature measurements, however, shows that the cylinder temperatures in four of the five points recorded ranged from 10 to 77 deg. Fahr. higher with the No. 10 cowling than the temperatures recorded in the test without cowling, while the oil temperature ran 9 deg. higher and the air temperature 2 deg.



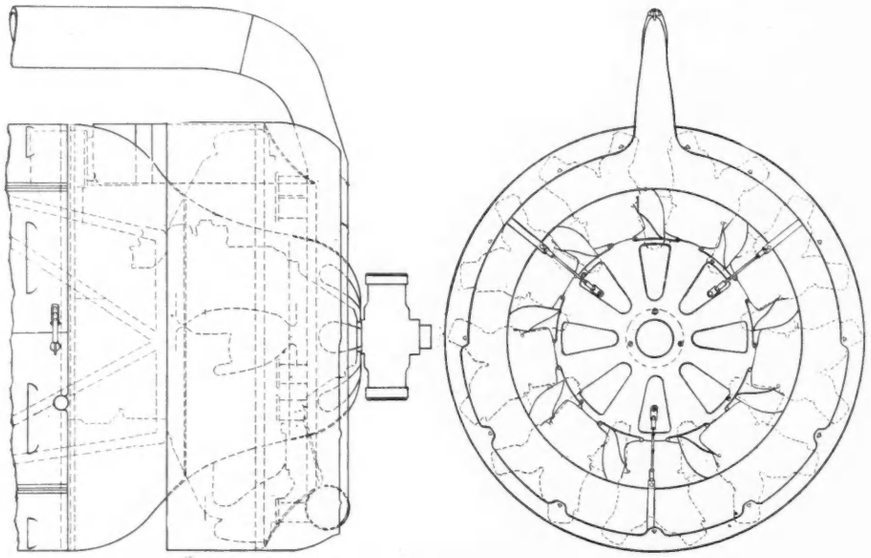
Showing relation between air speed and drag of fuselage and engine with the different cowlings

According to Kenneth M. Lane, chief airplane engineer of the Wright Aeronautical Corp., it is this fact which has led to some apprehension in his organization as to whether the engine cooling is in fact as good with the cowling as without it. In an engine which normally attains a fairly high temperature under ordinary service conditions, a relatively small rise in temperature may prove more serious than one is led to believe from the somewhat optimistic report of the N.A.C.A.

There is no disposition, however, to detract from the value of this important piece of research work, but Wright engineers feel that care needs to be exercised in applying the results to see that the engine is in fact satisfactorily cooled.

Wright customers and other users of air-cooled engines, as well as engine manufacturers, are keenly interested in the results of the test and see important possibilities of improved plane performance in their proper application, but as yet developments have not gone far enough for the engine

Curtiss AT-5A plane fitted with N.A.C.A. cowling



Modified N.A.C.A. cowling as used on new Wright radial engine

manufacturers to make any very definite recommendations for cowlings which are known to be satisfactory from the standpoint of proper cooling. Wright engineers are at work on the problem and are now conducting tests with a cowling made up in accordance with the accompanying drawing.

This cowling will be applied to a Curtiss J-6 C-1 and is similar in general design to the No. 10 cowling tested by the N.A.C.A. It is made to fit the Wright J-6 Whirlwind engine, which is fitted with an exhaust collector ring. This ring, as the drawing indicates, forms the leading edge of the cowling. To it are attached internal and external shells, or fairings, which come together at their trailing edge and are there joined to a cylindrical shell having the same diameter as the fuselage just aft of this point. This ring stops short of the fuselage, however, leaving an annulus from which the cooling air issues as in the case of the cowling used in the N.A.C.A. tests.

The internal cowling forming the nose of the fuselage is similar to that formerly employed on this plane. It is provided with eight good size openings which may be wholly or partly closed by means of a rotating slide to admit the desired amount of air for cooling the crankcase. Thirty-two outlet louvers provide an ample outlet area for the air taken in at the nose.

Although the N.A.C.A. report indicates that the No. 10 cowling produced no interference with the pilot's vision in any useful field, comments from other quarters indicate that this is not true in all cases in which cowlings of this type have been applied. In certain cases at least, pilots have become accustomed to utilizing the field of vision afforded between the cylinders when no external cowling is employed and prefer not to have this area obstructed by a cowling. This, however, is partly a question of personal viewpoints.

Apparently a number of plane manufacturers using radial cylinder engines are experimenting with the complete cowling and at least one application, that on the Lockheed-Vega plane which made a record flight across the continent just prior to the recent New York aircraft show, is said not only to have proved satisfactory but to have increased the speed of this plane about 20 m.p.h. Public attention was called to the cowling for the first time by that flight. Some difficulty was encountered at first with the Pratt & Whitney engine in this plane because of increased operating temperatures, but a change in the location of the exhaust ring is said to have brought the temperature back to normal. In the transcontinental flight, however, the exhaust ring was removed and short stacks discharging through the slot back of the cowling were substituted. The remarkable performance of the engine in the plane during this flight seems to indicate that a cowling can be designed to reduce the drag without seriously affecting the engine cooling.

The foregoing references to the tests conducted by the N.A.C.A. refer primarily to the original set of tests reported in Technical Note No. 301 and Report No. 313. These tests were made with a cabin fuselage. Since then, the N.A.C.A. has completed further tests using an open cockpit fuselage similar in shape to that of a Vought UO-1 and a conventional engine nacelle, with and without the new cowling. The results, in general, substantiated those obtained in the original group. It also was found that the reduction in drag with the complete cowling (similar to No. 10) as compared to conventional types was greater than that with the cabin fuselage. In the case of the completely cowled nacelle, the reduction in drag was over twice that with the cabin fuselage. Certain forms of individual fairings and hoods for engine cylinders tested proved to have little effect in reducing the drag. The results of the later tests are set forth fully in N.A.C.A. Report No. 314.

In addition to the results in respect to decreased drag, considerable data on engine performance and propeller efficiencies were secured and will be published in separate reports of the committee. On the whole, the investigation is a notable and exceedingly commendable piece of research work which hardly could have been undertaken in any privately-owned research laboratory.

AT a recent joint session in Paris of the International Chamber of Commerce, the committee on transport of the League of Nations, of the Railway Union, the Association Recognized National Automobile Clubs and the International Association of Automobile Manufacturers Associations (Bureau Permanent), the subject of freight transportation by truck and railroad without transshipment, which was first brought up at the international automobile congress in Rome last fall, was taken up and discussed at length. At Rome, Senator Crespi announced that the Automobile Club of Italy would offer a prize of $5,000 for the best solution of the problem of transportation of freight by both motor trucks and railways without reloading. A committee of experts has been appointed which is to formulate the rules for the competition. In Paris, Mr. Lawrence, the new European representative of the National Automobile Chamber of Commerce, spoke at length on the container system in use in this country. Senator Crespi believes that the use of such a system would effect savings equal to about two per cent of its total turnover.

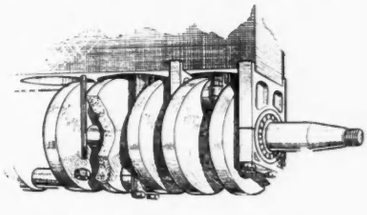
Bugatti Sixteen-Cylinder Engine Goes Into *Production*

The cylinders are arranged in two vertical banks of eight, each complete in itself, with the crankshafts united by gearing. The unit fits a sports-type chassis.

ETTORE BUGATTI just has gone into production with a 16-cylinder supercharged engine, having two vertical banks of eight cylinders, each one complete in itself, with the crankshafts united by gearing. The engine will be used in a sports-type chassis and will be run in numerous road races and competitions this year.

With a bore and stroke of 60 by 84 mm. (2.36 by 3.30 in.), the 16-cylinder Bugatti has a piston displacement of 3832 cc., or 234 cu. in., and develops 250 hp. for a weight of 500 lb. empty. It is stated that its normal speed is 5000 r.p.m., but that it has been braked at 7000 r.p.m.

By reason of the special design and construction, the 16-cylinder engine is more compact than the Bugatti straight eight of the same bore and stroke. It is carried under a shorter hood, of normal width, behind the usual narrow radiator.

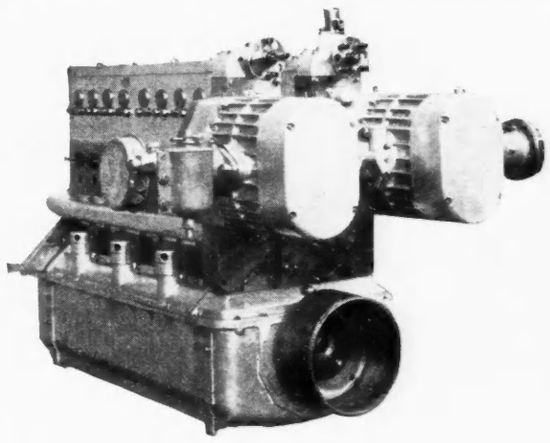


Detail showing how crankshaft bearings are mounted on cylinder block

The cylinder castings have a length of 22 in., and the width of the two blocks united is 14½ in. The total of the cylinder bores is just under 19 in., but in the remaining space of only a little more than 3 in. it has been possible to fit nine crankshaft bearings. This result has been obtained by the use of forged steel bearing supports fitting on the base of the cylinder block, each one secured by a pair of studs, as shown in the illustration. After the holes have been drilled and tapped in the cylinder block, a one-millimeter hole is drilled at right angle to it, in order to release the air when the stud is screwed in. The central crankshaft bearing is plain, but the eight others are rollers. The base of the cylinder block is ground and the top of the bearing supports, which are formed with lugs to fit on the base, are also ground.

Three vertical valves—two inlets and one exhaust—are carried in the head and are operated from a single overhead camshaft, through followers, as in normal Bugatti construction. The timing gear and all the auxiliaries with the exception of the oil and water pumps are at the rear. There is a Rootes-type compressor for each set of cylinders, with a Zenith carburetor on the outside of each compressor. It is at this point that the engine has its greatest width, but it is at this point too that there is greatest width under the hood.

A thick steel plate, the outer ends of which act as engine supports, unites the two cylinder blocks at the front. At the rear the blocks are united by the steel timing gear housing divided vertically into two parts. The two crankshafts are united by a spur pinion running at engine speed. The clutch member forms a flywheel. A chain of spur pinions drives the two compressors at engine speed, the overhead camshaft for each block of cylinders, and the magneto drive pinions. The magnetos themselves are on the instrument board, with the distributor and the make-and-break mechanism immediately in front of the driver, and they are operated by a tubular shaft with two fabric couplings.



Bugatti 16-cylinder 250 hp. engine weighing 500 lb. Rear view showing two Rootes blowers

Forged I-section connecting rods with split caps held by two bolts are used. The rods have a bronze bearing with a white metal lining.

Air-Cooled Engines Are *at Detroit Aircraft*

Statistics indicate, on the average, a considerable increase in aerodynamic efficiency. Flying boats are few, but many land planes have pontoon equipment.

WITH the aircraft industry at the highest peak of optimism it has ever known, the All-American Aircraft Show at Detroit might well serve as a basis of analysis for future development. Although Convention Hall could not accommodate all the applicants for space, basically, every phase of the industry was well represented, from accessories and engines through the small sport plane lines to the larger transports.

A number of the new planes exhibited were discussed in last week's issue of *Automotive Industries*. Others are described in the accompanying table of specifications, which had to be compiled before all the planes had reached the show room floor. While new models of engines were found in a large number of the ships, new manufacturers were not so much in evidence. Practically every model shown had seen sufficient service to be regarded as well out of the experimental stage.

Of the engines installed in the planes, a few OX's were still in evidence, but the ships in which they were shown were evidently designed to require considerably less than the 90 hp. rating of the OX for full load take-off and flight. Wright J-5's and J-6's, the latter in all of its three sizes, and in a number of cases fitted with the new N.A.C.A. cowling are evidently maintaining their popularity, judging from the number of ships in which they are found. The smaller and medium-sized engines, such as the LeBlond, Challenger, Axelson, Kinner, Walter, Comet, Velie and Warner radials, and Cirrus, Genet, Rover, Gypsy inline air-cooled (all except the Rover in this group being of basically British origin), have almost entirely displaced the OX engines. The Continental Motors engine was also shown in a ship for the first time, while the number of Pratt and Whitney powered Wasp-engined ships has been increased by the release of the Hornet for commercial sales.

An interesting feature noted was that with the exception of the 7 OX powerplants, there was not a single water-cooled engine shown installed in a plane, and of course all engines above 100 hp. were radials. Three-engined ships totaled only 4.4 per cent numerically, the smallest being the new Kreutzer plane with two LeBlond 60 wing, and one LeBlond 90 nose engines. Others were new editions of the well-known Ford and Fokker transports. Two-engined ships were unrepresented at the show, but two amphibians with tandem engines were demonstrated at the Detroit Boat Club.

Power and wing loadings shown in the accompanying table seem to indicate, on the average, a considerable increase in aerodynamic efficiency, especially when taken in conjunction with top speeds. Any accurate comparison between ships on the basis of these figures, however, would not present a true picture as power reserves, top speeds in relation to cruising speeds, and landing speeds differ so widely.

A further study of the table shows that of the planes exhibited were:

The upper view shows the Great Lakes Aircraft Corporation's first strictly commercial ship. This new training and sports plane is powered with a Cirrus III engine. Lower left—Parks Aircraft is another relatively new airplane manufacturer. Its first plane, the P-1, is shown here. Lower right—This Travel Air new three-place, 150 hp. Axelson plane has balanced ailerons and rudder, as will be noted. It is in the main of typically Travel Air design

Almost Universal *Show*

By
ATHEL F. DENHAM

This tapered-wing, J-5-powered Waco is the Advance Aircraft company's newest model. It is designed mainly for training and general purpose work

5.5 per cent sesqui planes
45.0 per cent monoplanes
43.0 per cent cabin ships
1.0 per cent flying boat
2.0 per cent seaplanes
2.0 per cent amphibians

The small number of flying boats was perhaps the most disappointing note. Many of the land planes are offered with pontoon equipment at extra cost, so the small number of seaplanes shown does not indicate a lack of interest in that field.

An interesting feature is found in the column covering dual and single controls, it showing that about 77 per cent of exhibited ships have dual controls. The joystick is evidently still preferred in most cases, only 16 per cent of the ships having wheel controls. On the other hand, only 7 per cent of the strictly land ships shown did not have a split axle type of construction, and practically 60 per cent of the land ships shown were equipped with brakes included in the list price.

Hydraulic, combination air and oleo, and straight oleo shock absorbers seem to be growing in favor, although 41 per cent of the ships still use only rubber and most of these are of the tension type. The former types are gaining headway chiefly on the larger ships, cost still being a prohibiting factor on many of the smaller types.

Still a greater variety of types and designs are found in the tail skids. Tail wheels are found on 25 per cent of the land ships, with leaf spring types on 27 per cent. There is one which is a combination of leaf spring and ball, with the remainder of the planes generally equipped with the replaceable shoe type but differing widely in design. Many are fitted with varieties of shock absorbing mechanisms.

Other design features of fairly recent adoption, at least in this country, are noted in the planes. Folding wings are found on such ships as the Fairchild, Whittelsey Avian, and American Eagle. The Avian also has the Handley Page slotted wings, as has the Gypsy Moth and Vought Corsair. The New N.A.C.A. cowlings were shown with Wright Whirlwinds on the Pitcairn and Lockheed Vega, with a Warner on the Paramount Cabinaire and with a LeBlond on the Centurian.

Planes Exhibited at 1929 All-American Aircraft Show

Are Listed Below and on the Following Page

MAKE	Type	Class	Places	ENGINE		WINGS		WEIGHTS				Materials		Controls	Land. Gear	Brakes?	Shocks	Tail Skid	Price	Top Speed m.p.h.
				No. and Make	Total hp.	Span	Area	Empty	Gross	Per hp.	Per Sq. Ft.	Wings	Fuselage							
Aerom-K1	TMo.	OL.	2	1-Salms	40	40–2	210	.....	1325	33.1	6.3	W&F.	Wd.	DS.	Sp.	N.	Ru.	St.	.....	80
Alexand.	TBi.	OL.	3	1-Siemen	180	36–8	....	.....	.....	.....	.....	W&F.	S&F.	DS.	Sp.	N.	Ru.	St.	.....	.....
Am. Eagle	TBi.	OL.	3	1-J6	150	27–11	300	1227	2041	13.6	6.6	W&F.	S&F.	DS.	Sp.	Y.	Ol.	Y.	5895	95
Am. Eagle	TBi.	OL.	2	LeBlond	65	27–11	168	550	1000	15.4	6.0	W&F.	S&F.	DS.	Sp.	N.	Ol.	Y.	2495	100
Am. Eagle	TBi.	OL.	3	Kinner	100	27–11	300	.....	2041	20.4	6.6	W&F.	S&F.	DS.	Sp.	Y.	Ol.	Y.	4595	90
Arrow	TBi.	OL.	2	LeBlond	60	26–6	178	815	1270	21.2	7.1	W&F.	S&F.	SS.	Sp.	N.	Ru.	Y.	2950	108
Avian	TBi.	OL.	2	Cirrus	95	28	....	875	1450	15.3	....	W&F.	W&F.	DS.	Sp.	N.	RC.	St.	4995	102
Avian	TBi.	OL.	2	Cirrus	95	28	....	.....	1360	14.3	....	W&F.	W&F.	DS.	Sp.	N.	RC.	St.	.....	.....
Barling	TMo.	OL.	3	LeBlond	65	32–6	160	690	1303	20.5	8.3	S&F.	S&F.	DS.	Sp.	N.	Ru.	Y.	3600	105
Bellanca	TMo.	CL.	6	1-J5	220	46–4	273	2229	5134	23.3	18.8	W&F.	S&F.	DS.	Sp.	Y.	Ru.	Sp.	14500	128
Blackb'n	TMo.	OL.	2	Cirrus	95	30	250	960	1550	16.3	6.2	W&F.	S&F.	DS.	Sp.	N.	Ru.	Y.	.....	104
Boeing	TBi.	OL.	1	Hornet	525	44–3	490	.....	5840	11.1	11.9	W&F.	SAF.	SS.	Sp.	Y.	Ol.	Ol.	.....	140
Buhl	TSe.	CL.	8	1-J5	220	48	....	.....	.....	.....	.....	W&F.	S&F.	.....	Sp.	Y.	Ol.	.....	.....	.....
Buhl	TSe.	CL.	3	1-J5	220	36	240	1760	3200	14.5	13.3	W&F.	S&F.	DS.	Sp.	Y.	Ol.	.....	11000	139
Buhl	TSe.	CS.	6	1-J6	300	40	305	2350	4500	15.0	14.7	W&F.	S&F.	DS.	Sp.	N.	Ol.	.....	13500	145

MAKE	Type	Class	Places	ENGINE		WINGS		WEIGHTS				Materials		Controls	Land. Gear	Brakes?	Shocks	Tail Skid	Price	Top Speed m.p.h.
				No. and Make	Total hp.	Span	Area	Empty	Gross	Per hp.	Per Sq. Ft.	Wings	Fuselage							
Butler	TBi.	OL.	3	1-J5	200	34	310	.....	2900	14.5	9.3	W&F.	S&F.	DS.	Sp.	Y.	Ru.	Y.	7995	140
Century	TMo.	CL.	3	LeBlond	90	32–3	192	1015	1875	20.8	9.7	W&F.	S&F.	SS.	Sp.	N.	Ru.	Sp.	4975	135
Cessna	TMo.	CL.	4	Warner	110	40–6	240	.....	.....	.....	.....	W&F.	S&F.	DS.	Sp.	Y.	Ru.	Sp.	7115	....
Cessna	TMo.	CL.	4	Curtiss	170	.....	.....	.....	.....	.....	.....	W&F.	S&F.	DS.	Sp.	Y.	Ae.	Sp.	8500	....
Coffman	TMo.	CL.	4	1-OX	90	37	223	1250	2010	22.3	9.0	W&F.	S&F.	DS.	Sp.	N.	Ru.	Sp.	3500	120
Cmd-Aire	TBi.	OL.	3	Axelson	150	31–6	303	.....	.....	.....	.....	W&F.	S&F.	DS.	Sp.	N.	Ru.	Sp.	.....	....
Cmd-Aire	TBi.	OL.	2	Warner	110	31–6	303	.....	.....	.....	.....	W&F.	S&F.	DS.	Sp.	N.	Ru.	Sp.	.....	....
Consol	TBi.	OL.	2	Warner	110	.....	.....	.....	.....	.....	.....	W&F.	S&F.	DS.	Sp.	N.	OS.	Ol.	5500	....
Consol	TBi.	OL.	2	1-J5	200	.....	.....	2707	2362	11.8	.....	W&F.	S&F.	DS.	Sp.	N.	Ru.	St.	.....	....
Cunningham	TBi.	CL.	6	1-J6	300	42	378	.....	3750	12.5	9.9	W&F.	SAF.	DS.	Sp.	Y.	Ol.	Y.	16000	....
Curt. R'd	TBi.	OL.	2	Cirrus	95	33	238	900	1650	17.4	6.9	A&F.	S&F.	DS.	Sp.	N.	RC.	Y.	4650	128
Curtiss	TMo.	CL.	3	Curtiss	170	41	245	728	1068	6 3	4.4	WAF.	S&F.	SS.	Sp.	Y.	Ae.	Y.	7500	....
Curtiss	TMo.	CL.	3	1-OX	90	41	245	728	1068	11.8	4.4	WAF.	S&F.	SS.	Sp.	Y.	Ae.	Y.	4000	....
Curtiss	TBi.	OL.	2	Curtiss	170	.....	.....	.....	.....	.....	.....	W&F.	S&F.	DS.	Sp.	Y.	Ol.	Y.	.....	....
Eastman	TSe.	OB.	3	Curtiss	170	36	256	1416	2190	13.1	9.0	W&F.	Dur.	DW.	N.	N.	N.	N.	8750	110
Fairch'd	TMo.	CL.	7	1 Wasp	410	50	332	3000	5649	14.1	17.0	W&F.	S&F.	SS.	Sp.	Y.	Ol.	W.	18900	145
Fairchd	TMo.	OL.	2	1 Genet	80	28–3	140	755	1250	15.6	8.9	W&F.	S&F.	SS.	Sp.	Y.	Ol.	W.	4250	105
Fokker	TMo.	CL.	7	1 Wasp	410	50–7	387	.....	5050	12.3	13.0	Wd.	S&F.	DS.	Sp.	Y.	Ru.	Y.	19340	139
Fokker	TMo.	CL.	14	3-P&W	1500	79–3	850	.....	12500	8.3	14.6	Wd.	S&F.	DW.	Sp.	Y.	Ru.	Y.	60000	150
Ford	TMo.	CL.	12	3–J6	900	74	.....	.....	10130	11.3	.....	A-M.	A-M.	DW.	Sp.	Y.	Pn.	W.	.....	130
Ford	TMo.	CL.	14	3-Wasp	1230	77–10	.....	.....	12650	10.3	.....	A-M.	A-M.	DW.	Sp.	Y.	Pn.	W.	.....	140
General	TMo.	CL.	3	Warner	110	36–6	225	800	1300	11.8	5.8	W&F.	S&F.	SS.	Sp.	Y.	RC.	W.	7500	112
Gliders	TMo.	OL.	1	None	0	34	.....	.....	.....	No.	.....	W&F.	Wd.	SS.	No.	N.	No.	No.	.....	....
Gr. Lakes	TBi.	OL.	2	Circus	95	26–8	.....	.....	.....	.....	.....	WAF.	S&F.	DS.	Sp.	Ex.	Ru.	Sp.	3000	°115
Hamilton	TMo.	CS.	8	Hornet	525	54–5	390	3425	5750	10.9	14.7	S&A.	A-M.	DW.	Fl.	N.	N.	N.	24500	135
Hamilton	TMo.	CL.	8	1-Wasp	410	54–5	390	3250	5750	14.0	14.7	S&A.	A-M.	SW.	Sp.	Y.	Ae.	W.	23200	134
Heath	TMo.	OL.	1	Henderson	27	25	110	290	515	19.0	4.7	W&F.	S&F.	SS.	Ax.	N.	Ru.	Sp.	695	70
Heath	TMo.	OL.	1	Cherub	30	18	50	235	535	17.8	10.7	W&F.	S&F.	SS.	Sp.	N.	N.	Sp.	3000	150
Invinc	TMo.	CL.	4	Curtiss	170	38	218	1290	.....	.....	.....	W&F.	S&F.	DW.	Ax.	N.	Ol.	W.	7800	....
Knoll	TBi.	CL.	4	1-J5	220	33–6	264	1800	3050	13.8	11.6	W&F.	S&F.	SS.	Sp.	Y.	Ol.	St.	13500	§130
Kreider R.	TBi.	OL.	3	1-OX	90	30–1	296	.....	1296	14.4	4.3	W&F.	S&F.	DS.	Ax.	N.	Ru.	Y.	3100	102
Kreider R.	TBi.	OL.	3	Warner	110	.....	.....	.....	1204	10.9	.....	WAF.	S&F.	DS.	Sp.	N.	Ru.	Y.	5300	....
Kreider R.	TBi.	OL.	3	1-Comet	135	.....	.....	.....	.....	.....	.....	WAF.	S&F.	DS.	Sp.	Y.	Ru.	Y.	6115	126
Kreider R.	TBi.	OL.	3	Warner	110	.....	.....	.....	.....	.....	.....	WAF.	S&F.	DS.	Sp.	Y.	Ru.	Y.	5635	112
Kreutzer	TMo.	CL.	6	3-LeBlond	220	48–10	315	2085	3700	17.0	11.7	W&F.	S&F.	DS.	Sp.	Y.	Ol.	W.	15800	118
Laird	TBi.	OL.	3	1-J5	220	34	.....	.....	.....	.....	.....	W&F.	S&F.	DS.	Sp.	Y.	Ru.	Ru.	.....	....
Lincoln	TBi.	OL.	3	1-OX	90	32	298	1270	1800	20.0	6.0	W&F.	S&F.	DS.	Sp.	N.	Ru.	Sp.	1985	*100
Lockheed	TMo.	CL.	6	1-Wasp	410	41	235	2300	4033	9.8	14.7	Wd.	Wd.	DS.	Sp.	Y.	Ae.	Y.	19250	170
Lockheed	TMo.	CL.	6	1-J6	300	42–6	235	2050	4033	13.4	14.7	Wd.	Wd.	DS.	Sp.	Y.	Ae.	Y.	15000	170
Loening	TBi.	CA.	8	Cyclone	525	.....	.....	.....	.....	.....	.....	W&F.	W&A	DW.	Re.	N.	Ol.	Y.	.....	....
Mahoney	TMo.	CL.	6	1-J6	300	42–4	280	2200	4000	13.3	14.3	W&F.	S&F.	DS.	Ax.	Y.	Ae.	.....	.....	140
Metal-Air	TMo.	CL.	8	1-Wasp	410	50	370	2960	5600	13.6	15.1	A-M.	A-M.	DW.	Sp.	Y.	Ae.	W.	23800	135
Mono-Air	TMo.	OL.	2	1-Velie	60	32	150	825	1350	22.5	9.0	W&F.	S&F.	DS.	Sp.	N.	Ol.	Sp.	2675	100
Mono-Air	TMo.	CL.	2	1-Velie	60	32	150	825	1350	22.5	9.0	W&F.	S&F.	SS.	Sp.	N.	Ru.	Sp.	2975	97
Mono-Air	TMo.	CL.	4	1-Velie	180	40	.....	1825	3250	18.1	.....	W&F.	S&F.	DS.	Sp.	Y.	Ol.	W.	7950	129
Moundsv	TBi.	OL.	2	1-Rover	60	28–10	210	900	1450	24.2	6.9	W&F.	S&F.	DS.	Sp.	N.	Ol.	Sp.	.....	100
Moth	TBi.	OL.	2	Gypsy	90	30	.....	909	1400	15.5	.....	WSF.	S&F.	DS.	Sp.	N.	Ru.	Y.	3600	105
New Std.	TSe.	OL.	5	1-J5	220	45	350	2030	3400	15.4	9.7	W&F.	A&F.	SS.	Sp.	Y.	Ol.	Ol.	9000	125
Paramount	TBi.	CL.	4	Warner	110	34–8	309	1350	2232	20.3	7.8	WSF.	S&F.	DS.	Sp.	Y.	Ol.	Sb.	7200	106
Parks	TMo.	CL.	4	1-J5	200	45	.....	.....	.....	.....	.....	W&F.	S&F.	DS.	Sp.	Y.	Ol.	W.	.....	....
Pitcairn	TBi.	OL.	1	Wright	220	33	252	1892	3050	13.6	11.5	W&F.	S&F.	SS.	Sp.	N.	Ol.	Y.	10500	128
Rearwin	TBi.	OL.	3	Curtiss	170	35	.....	1415	2300	8.3	.....	W&F.	S&F.	SS.	Sp.	Y.	Ae.	.....	.....	135
Simplex	TMo.	OL.	2	Warner	110	34	.....	.....	.....	.....	.....	W&F.	S&F.	DS.	Sp.	N.	Ol.	Y.	.....	....
Spartan	TBi.	OL.	3	Walter	120	32	293	1310	2150	17.9	7.3	W&F.	S&F.	DS.	Sp.	N.	Ru.	Sp.	5250	110
Spartan	TBi.	OL.	3	Curtiss	170	32	293	1550	2150	12.6	7.3	W&F.	S&F.	DS.	Sp.	Y.	Ol.	W.	6750	120
Stearman	TBi.	OL.	3	1-J6	220	35	.....	.....	.....	.....	.....	W&F.	S&F.	DS.	Sp.	Y.	RH.	.....	8500	126
Stearman	TBi.	CL.	4	1-J6	300	.....	.....	.....	.....	.....	.....	W&F.	S&F.	.....	Sp.	Y.	RH.	.....	12500	....
Stinson	TMo.	CL.	6	1-J6	300	45–10	292	.....	.....	.....	.....	W&F.	S&F.	DW.	Sp.	Y.	Ae.	W.	12500	135
Stinson	TMo.	CL.	4	1-J6	150	41–10	234	.....	.....	.....	.....	W&F.	S&F.	DS.	Sp.	Y.	Ae.	W.	7500	128
Stinson	TMo.	CL.	3	1-Cont	165	41–10	234	.....	.....	.....	.....	W&F.	S&F.	DS.	Sp.	Y.	Ol.	W.	7500	....
Stinson	TMo.	CL.	8	1-Wasp	425	51	.....	.....	.....	.....	.....	W&F.	S&F.	DW.	Sp.	Y.	Ol.	W.	18500	135
St. Louis	TMo.	CL.	2	LeBlond	65	32–4	162	825	1425	21.9	8.8	W&F.	S&F.	DS.	Sp.	Y.	Pn.	W.	2950	105
Swallow	TBi.	OL.	3	Axelson	150	32–8	300	1574	2497	16.6	8.3	W&F.	S&F.	DS.	Ax.	N.	Ru.	Y.	5850	115
Swallow	TBi.	OL.	2	1-OX	90	30–11	296	1240	1825	20.3	6.1	W&F.	S&F.	DS.	Ax.	N.	Ru.	Y.	2593	90
Swift	TBi.	OL.	2	Kinner	100	29	218	1002	1620	16.2	7.5	W&F.	S&F.	DS.	Sp.	N.	Ol.	Y.	.....	110
Swift	TBi.	OL.	2	1-OX	90	33	258	1200	1900	21.1	7.3	W&F.	S&F.	DS.	Sp.	N.	Ru.	Y.	.....	87
Travel-Air	TBi.	OL.	3	Axelson	150	34–8	296	1550	2475	16.5	8.4	W&F.	S&F.	SS.	Sp.	Y.	Ru.	Y.	5850	120
Travel-Air	TMo.	CL.	4	Curtiss	170	38	.....	.....	2250	13.2	.....	W&F.	S&F.	DW.	Sp.	Y.	O1.	W.	8890	126
Travel-Air	TMo.	CL.	8	1-J6	300	48–8	.....	2350	4000	13.3	.....	W&F.	S&F.	DW.	Sp.	Y.	Ae.	W.	13500	137
Trella	TBi.	OL.	2	1-Velie	60	27–6	192	600	1050	17.5	5.5	W&F.	S&F.	DS.	Sp.	N.	Ru.	Sp.	2600	110
Verville	TMo.	CL.	4	Wright	150	41	.....	.....	.....	.....	.....	W&F.	S&F.	DW.	Sp.	Y.	Ru.	W.	.....	....
Vought	TBi.	OA.	2	1-Wasp	410	36	320	2650	3700	9.0	11.6	W&F.	S&F.	DS.	Re.	N.	Ol.	Sp.	.....	140
Waco	TBi.	OL.	3	1-J5	225	.....	.....	.....	.....	.....	.....	W&F.	S&F.	.....	Sp.	Y.	Ae.	Sp.	.....	....
Waco	TBi.	OL.	3	1-J6	300	.....	.....	.....	.....	.....	.....	W&F.	S&F.	.....	Sp.	Y.	Ae.	Sp.	.....	....
Waco	TBi.	OL.	3	1-J6	150	30–7	286	.....	.....	.....	.....	W&F.	S&F.	SS.	Sp.	Y.	Ae.	Sp.	6000°	....
Waco 90	TBi.	OL.	3	1-OX	90	30–7	286	1225	2025	22.5	10.9	W&F.	S&F.	SS.	Sp.	E.	Ol.	Sp.	.....	96

ABBREVIATIONS:

Type and Class
A—Amphibian
B—Flying Boat
Bi—Biplane
C—Closed
L—Land
Mo—Monoplane
O—Open
P—Pusher
S—Seaplane
Se—Sesquiplane
T—Tractor

Shocks
Ae—Air and oil
Ol—Oleo
OS—Oil and spring
Pn—Pneumatic
RC—Rubber (Compression)
RH—Rubber and Hydraulic
Ru—Rubber cord

Price
°—Approximate
*—Without motor
§—Price with J-6

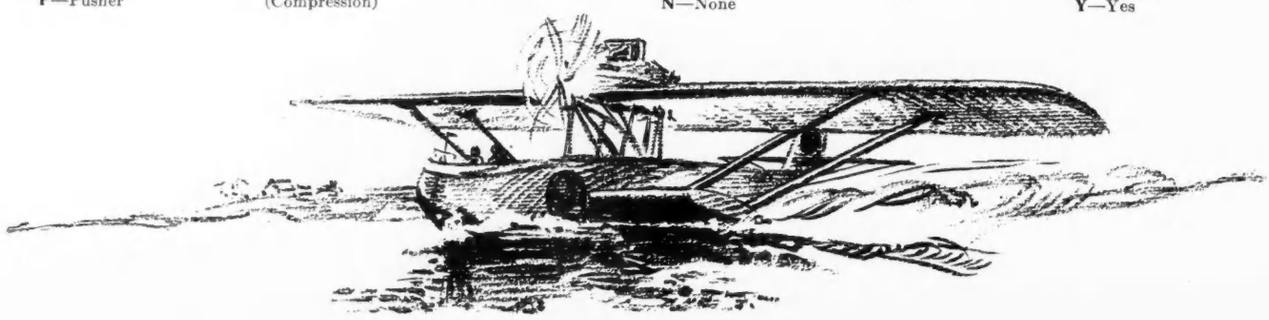
Materials
A—Aluminum
A-M—All Metal
Dur—All Dural
F—Fabric
S—Steel
W—Wood
Wd—All wood

Landing Gear
Sp—Split Axle
Ax—Axle
N—None
Fl—Float
Re—Retractable

Controls
DS—Dual stick
DW—Dual wheel
SS—Single stick
SW—Single wheel

Brakes
E—Extra
N—No
Y—Yes

Tail Skid
N—None
Ol—Oleo
Sb—Spring and ball
Sp—Leaf spring
St—Steerable
W—Wheel
Y—Yes



High Temperature *Cooling Agent Found in* Ethylene-Glycol

By Edmund B. Neil

INFORMATION released to date by the War and Navy departments concerning the recently announced development of a new cooling agent for use in water-cooled engines reveals that the fluid is ethylene-glycol. It is the same as the commercial product used as an anti-freeze, which was introduced in the market several years ago.

Such a simple statement should by no means be interpreted, however, as meaning that the adaptability of this liquid to the process of cooling internal combustion engines was learned in any way other than by elaborate tests, the detailed results of which have not as yet become public property.

Since the product is known, however, and other facts pertaining to it have been made available, it is possible to draw certain conclusions.

The specific heat of ethylene-glycol (Prestone) $[C_2H_4(OH)_2]$ is given as 0.68 or about 2/3 that of water. Its boiling point is 387 deg. Fahr. and freezing point well below any degree of cold to be found normally. It has a specific gravity of 1.114.

Since ethylene-glycol is a definite chemical compound and therefore has a fixed boiling point, as contrasted with another group of cooling agents which have been tried, the petroleum hydrocarbons, which do not, it is essentially similar to water in its general behavior, except of course, that it can be heated to a much higher temperature if arrangements permit.

With higher normal operating temperature, it is obvious that the temperature difference between the radiator and the surrounding air would be greater, hence reduction in its size is possible. This has been reported to be as much as ½ the total area with a reduction in weight of over 80 lb. for a large airplane engine, part of this also being in the smaller amount of solution required. It is quite possible that some of the gain in reduced frontal areas and weight would be offset by the lesser specific heat of the fluid, but this may again be offset by moving it faster through the cooling system.

Oil Cooling Necessary

It also seems practicable to conclude that with higher operating temperatures, better facilities for cooling the lubricating oil should be provided if oiling conditions are to be maintained on a par with those when water is used, particularly since adequate lubrication was one of the problems faced in early experiments with high temperature media. When this condition is taken care of, and compensation for differences in running fits due to greater expansion made, it appears likely that power increases of several per cent are attained, although reports up to this time make no mention of this factor.

In the early days of the industry, many methods of engine cooling were experimented with and while but two conventional systems have been the outcome in the automotive field, mention of the others in a manner somewhat different than is customary will be made here, since they have a direct bearing upon the Government's work:

Direct Air Cooling:
- (a) Natural Air Flow
  1. Small stationary engines.
  2. Motorcycle engines.
  3. Early automobile engines.
- (b) Forced Draft
  1. Radial and "in-line" airplane engines (propeller draft) (pressure).
  2. Automobile engines (suction and pressure fans).

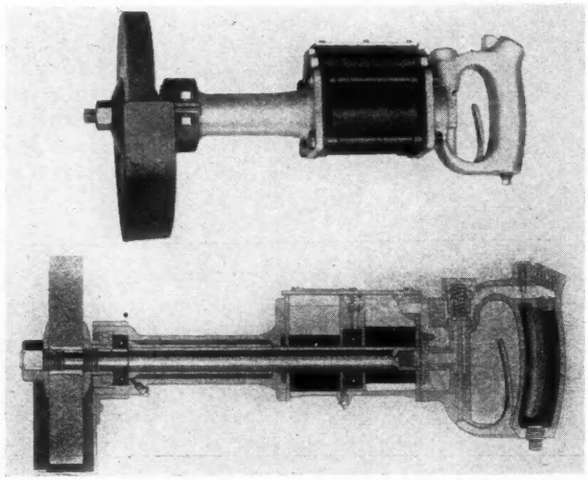
Indirect Air-Cooling:
- (a) Jacketed Cylinders Without Radiator
  1. Hopper-cooling (evaporative) (oil and water) (stationary engines).
- (b) Jacketed Cylinders With Radiator
  1. Water-cooling (conventional).
  2. Oil-cooling (kerosene, high B/P oils) (traction engines and early automobile experimental engines).
  3. High B/P media (airplane and possible automobile engine applications).

The most obvious disadvantage of conventional water-cooling lies in the fact that the operating temperature of the engine cannot exceed the boiling point of water, which in turn is sometimes lower than normal both in airplanes and automobiles due to the effect of altitude. On the other hand air-cooling permits of operating temperatures exceeding the nominal range of from a 150 to 200 deg. Fahr., but at a certain disadvantage, that the maximum may vary appreciably depending upon operating conditions. The development of evaporative cooling (steam cooling) while not permitting the temperature to rise much above the boiling point of water, on the other hand, does result in the ability to maintain a more constant running temperature. The temperature is also normally above that permitted with the conventional water-cooling system, and that a higher operating temperature of the cylinder jackets should theoretically result in higher thermal efficiency with improved economy in fuel consumption is obvious. That it may not have done so in the past apparently reflects only the inability to control other factors affected by the increased temperature. In this connection, it would seem that if the temperature were kept at much over 300 deg. Fahr. for a time, deterioration of the usual rubber connections would occur, since this is close to the vulcanizing temperature of rubber.

NEW DEVELOPMENTS—Automotive

Rotor Air Tool Grinder

THE Rotor Air Tool Co., 5905 Carnegie Ave., Cleveland, Ohio, has brought out a new high production D-3 grinder designed for use with 8 by 1 in. rubber, Bakelite and elastic bonded wheels. The grinder operates under load at 4300 r.p.m., in order to provide a surface speed of 9000 ft. per minute for 8-in. wheels.

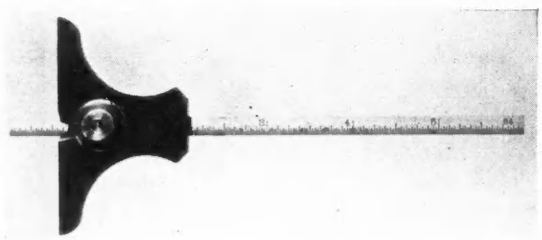


Photograph and cross-section of new Rotor Air grinder

A patented rotor governor controls the speed regulating the intake air and keeping the machine at constant speed under load. The machine weighs only 16 lb. with guard, and is furnished either with straight or spade type handle. The rotors of the new machine are accurately balanced so that the machine runs without vibration, thus preventing the wheels from wearing out of round, and increasing wheel life.

Brown & Sharpe Depth Gage

A RULE depth gage having an easily adjusted protractor, has just been announced by Brown & Sharpe Mfg. Co., Providence, R. I. As a protractor, the blade of the gage is easily locked at any angle in



Brown & Sharpe rule depth gage

relation to the head by the larger of the two clamp nuts on the front side of the head.

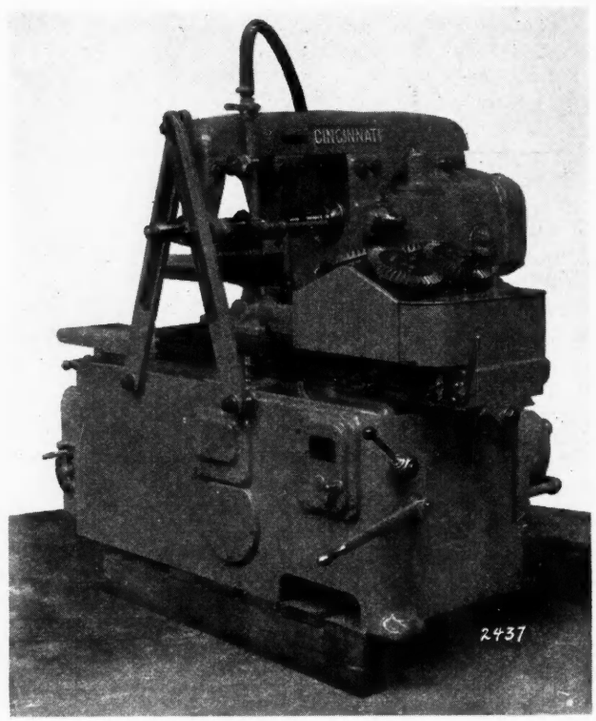
The turret is graduated every 10 deg. from 0 to 90. The 6-in. blade is graduated in 32nds and 64ths of an inch. English measure, or in millimeters and half-millimeters, metric measure.

Machining Differential Gears

DIFFERENTIAL bevel gears, having 42 teeth, pitch diameter of 4 in., pitch depth of 0.12 in. and a full depth of 0.65 in., are being machined by one company at the rate of 4.3 finished pieces per hour.

The machine used is a Cincinnati 4-36 plain hydromatic milling machine on which the work is mounted by means of four work-holding spindles, which are a part of a special automatic indexing fixture securely attached to the machine table. The cutters mill one tooth in the four gears, the table then automatically returns and trips into automatic advance.

The automatic indexing mechanism is designed so that the return movement of the table withdraws the



Cincinnati hydromatic set-up for gashing bevel gears

index pins from the individual index plates and engages a ratchet which indexes all four gears on the return movement of the table. The cycle of operations is entirely automatic so that all four gears are completely gashed with no attention from the operator other than loading and unloading the work and tripping the automatic cycle.

On the forward end of the table is a small lever connected to a flipper dog which permits the table to return about 15 in. away from the cutters to make loading easier.

The gear material is S.A.E. 1045 steel. Two 5 in. diameter special form high speed steel cutters are

Parts, Accessories and Production Tools

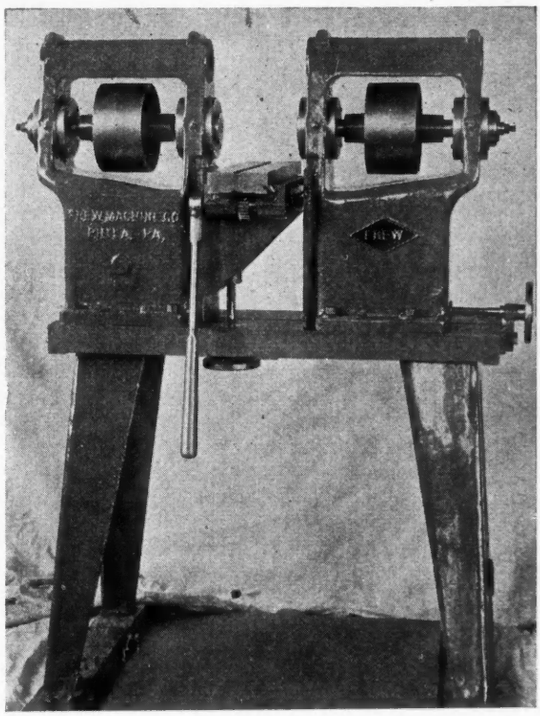
mounted on a special arbor, revolve at 85 r.p.m. against a table feed of 6 in. per min. Time per piece is 11.9 min. which gives a production of about 35 pieces per 8-hr. day.

Safe-Tee Circuit Breaker

W. E. KAUTENBERG CO., Freeport, Ill., has developed a Safe-Tee circuit breaker designed to prevent fires in cars, tractors or motor boats when they are tipped over. The device consists essentially of a small Bakelite unit in which two electric terminals are connected by mercury when the car is in normal position. As soon as the car tips at a dangerous angle, or overturns, the circuit is broken and the ignition is shut off instantly.

Frew Hand Miller

THE Frew Machine Co., 124 West Venango Street, Philadelphia, Pa., has developed a No. 2 duplex hand miller, designed particularly for milling parallel faces on opposite sides of work. The machine has one stationary column and one movable, the stationary column carrying the knee, saddle and table. The table is moved by means of a hand lever and gear meshing

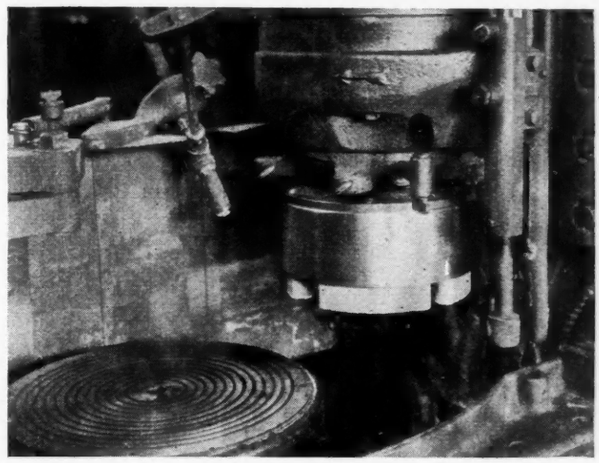


Frew No. 2 duplex hand miller

with a rack at the bottom of the table. Vertical movement of the knee is made by means of a hand wheel. The spindles are of alloy steel and are carried in Timken tapered roller bearings. The machine is regularly furnished for single pulley drive, but can also be furnished with cone pulleys.

Blanchard 11-in. Segment Wheel

THE Blanchard Machine Co., Cambridge, Mass., has developed an 11-in. segment wheel for its No. 10 grinder, along similar lines to the 18-in. segment wheel announced a few months ago in these columns. The new wheel consists of a chuck body machined from a solid steel forging, four abrasive segments with rounded ends, two fixed partitions secured in the chuck body and two clamping units consisting of shoes fitting the



Blanchard 11-in. Segment Wheel mounted on a No. 10 Blanchard surface grinder

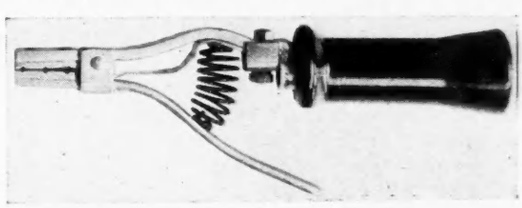
ends of the segments and expanded by a wedge and screw.

No backing plates or screws are used, as the segments are securely held by the action of the clamping units and there are only two screws to loosen and tighten when adjusting or changing segments. The body is cadmium plated to resist rust, while the other parts are made of aluminum bronze, except the screw, which is stainless steel. Abrasive segments are 5 in. deep when new and 4 in. of this length can be used.

The segment wheel mounts on the faceplate of the machine in the same manner as a standard ring wheel and can be removed easily at any time, if it is desired to use a ring wheel on the same machine. No change is necessary in the No. 10 Blanchard grinder when using the segment wheel.

Lincoln Electrode Holder

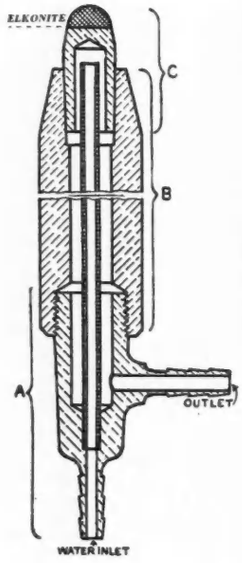
AN electrode holder for metallic arc welding, designed for greater operator convenience, has been developed by the Lincoln Electric Co., Cleveland, Ohio.



Lincoln metal electrode holder

The holder consists of a powerful clamp to hold the welding electrode firmly while welding, with an easy release feature which permits changing electrodes quickly. The handle grip is designed for easy holding and operates without becoming greatly heated. Copper tips on the jaws reduce sticking of the electrode and all metallic parts of the holder are coated with cadmium plating.

Welding Tips

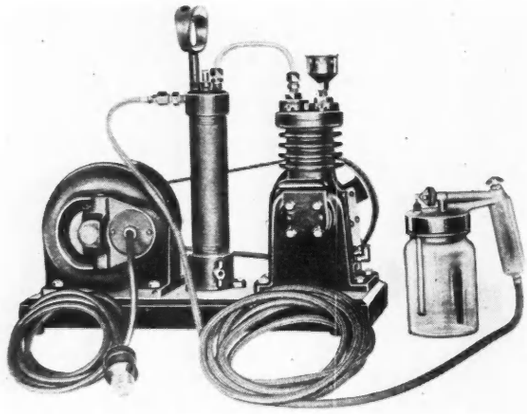


ELKON, INC., Division of P. R. Mallory & Co., Inc., New York City, has developed a water-cooled replaceable tip for electric spot welding electrodes which can be used continuously for almost eight hours without redressing. A speed of 250 spot welds per minute is possible. A small tip of Elkonite is autogenously welded to the shank of copper, while the tip is cooled with a water-cooling system, as shown in the attached sketch.

Elkonite tip electrode for spot welding

Portable Paint Spray Outfit

A SMALL, portable, self-contained spray painting and finishing outfit has been developed by the DeVilbiss Co., Toledo, Ohio, and is known as the Type NC-601. The outfit is complete with air compressor ready for use. The operator merely puts the material into the paint container, plugs the electrical connection



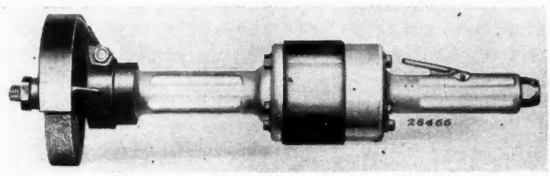
DeVilbiss portable spray painting and finishing outfit

into a handy light socket and goes to work. It delivers a finely atomized spray, adjustable from a round spray to a fan spray 3½ in. in width. The outfit weighs 47½ lb. complete, and can be carried easily from place to place. The air supply is ample and the pressure constant.

Ingersoll-Rand Pneumatic Grinder

A NEW portable pneumatic grinder, known as the Multi-Vane grinder, has been developed by Ingersoll-Rand Co., 11 Broadway, New York. This tool uses a multi-vane rotor, which makes a light and smooth-running tool. It is fitted with a speed governor which gives power where it is wanted, yet keeps the grinding wheel from operating at dangerous speeds. It can be adjusted to any desired speed up to 6300 r.p.m. Standard machines are set at 4200 r.p.m., which is the best speed for 6-in. vitrified and 8-in. elastic bonded wheels.

The rotor is made of steel, hardened and ground to reduce wear, and is a full-floating fit on its arbor. It is equipped with four power vanes, which balance the turning effort on the rotor and give a very smooth flow of power. An exhaust deflector serves as a muffler and



Ingersoll-Rand multi-vane pneumatic grinder

baffles the exhaust air passing through it to remove the screech that is typical of many other rotary grinders.

The wheel end bearing consists of two radial thrust ball bearings, so that grinding on either side of the wheel will not destroy it. The handle of the tool contains an oil chamber from which oil is automatically fed into the live air, going to the machine every time the grinder is stopped and started.

Cassel's Registering Speedometer

A REGISTERING speedometer invented by G. E. Cassel of Stockholm, Sweden, has been introduced in this country. According to the sponsors of the device, its principal object is to enable the owner of a car to check the driving of his chauffeur, as well as to give a means of testing the performance of the car with respect to acceleration and braking. The Cassel speedometer at all times gives a visible record of the speeds of the car during the last mile covered, the record vanishing at the rate at which it is built up.

On the dial of the device there are a number of concentric circles, each of which represents a definite speed. There are also 100 radial grooves on the dial, and in each groove is placed a button which is capable of radial motion therein. The dial containing the grooves and buttons makes one revolution per mile covered. At the top of the instrument there is a three-cornered tongue, which does not assume the rotary motion, but takes a position dependent upon the vehicle speed. As a button passes the right edge of the tongue, it is moved in a radial direction to a position depending upon the speed of the car. Thus, a closed curve is formed by the 100 buttons which constitutes a graph of the speed which the car has maintained for the last mile.

In addition to the movable buttons, the instrument is comprised of an indicator hand whose axis is located at the center of the device. Normally, the point of this hand is hidden beneath the left portion of the three-cornered tongue. However, should the car be driven

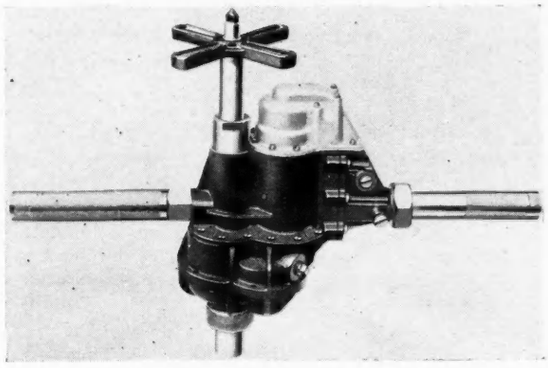
at a speed in excess of say, 70 m.p.h., and should this speed be maintained for a distance of more than 1000 ft., the hand is freed and describes one revolution, coming to a stop with the point visible at the right side of the tongue. If now the speed is reduced below 70 m.p.h. the pointer begins to move slowly backward and returns to its original position after a distance of 20 miles has been covered. However, if a speed of 70 m.p.h. should be reached again before the pointer has returned to its original position, and this speed maintained for a distance of at least 1000 ft., the pointer immediately would return to the right-hand side of the tongue.

The inner circular scale on the dial, which represents a distance of 20 miles, always shows the distance from the point where the speed of 70 m.p.h. was exceeded last.

We understand that this instrument has been thoroughly tested in the Swedish Government Testing Institute in Stockholm, and has been found satisfactory. It also has been in use on a number of cars for several years. While the instrument has been developed primarily for the use of motorists, it is obvious that it also may be used by the police in controlling traffic on the public highways.

Rotor Air Drill

THE Rotor Air Tool Co., 5905 Carnegie Ave., Cleveland, Ohio, announces a new rotor, governor-controlled drill, designated type E-5, which is suitable for heavy-duty drilling, reaming and nut setting. The drill weighs 22 lb., is compact, well-balanced and ruggedly built. The governor automatically prevents racing at idle speeds, and reduces air consumption to a minimum. The rotor motor with only three moving parts provides ample power which is transmitted through compound gears, three speeds being provided of 220, 280 and 350 r.p.m.



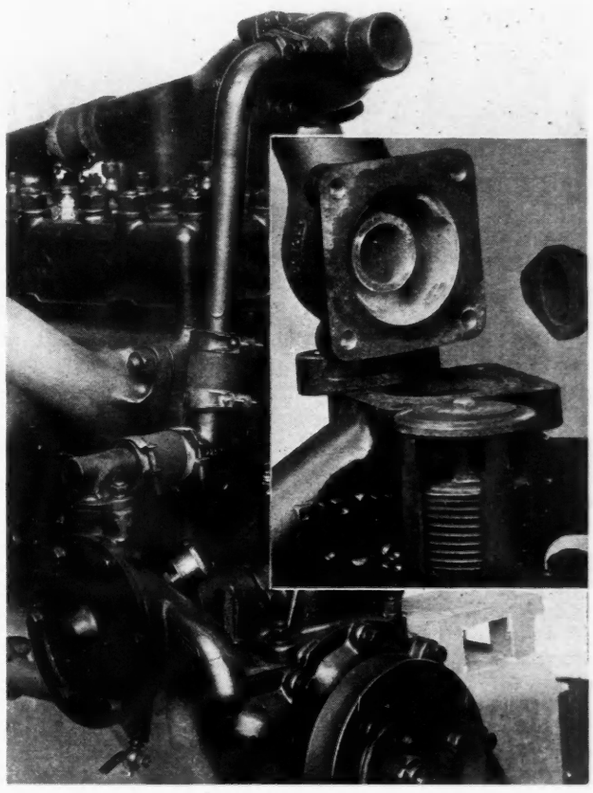
Rotor E-5 Air Drill

Positive lubrication is provided by means of an oil reservoir in the body. The feed screw is of a heavy-duty type with 3½-in. travel. The machine is made in two models, either reversible or non-reversible, and both are suitable for work up to 1¼ drilling, 13/16-in. reaming and the reversible motor for ⅞-in. tapping.

Mack Cooling System Control

ALL trucks, buses and fire-fighting vehicles turned out by Mack Trucks, Inc., are now fitted with a thermostat in the cooling system which prevents circulation of cooling water through the engine jackets as long as the water therein is at a comparatively low temperature. The thermostat is of the Sylphon bellows type and is located in the water outlet from the engine jacket.

The bellows control a flat-headed poppet valve which floats between two ports, one opening into the cylinder-head riser and the other into a by-pass pipe from the pump delivery port. When the engine is cold, the port of the cylinder head riser is closed, and the water moved by the pump then passes directly to the top of the radiator. With increase in engine temperature the port in the cylinder head riser is partly opened, and for a while part of the water moved by the pump will flow through the jacket while the rest is by-passed. When the engine reaches a predetermined maximum temperature, the port in the by-pass passage is closed by the thermostatic valve and all of the water from the pump then circulates through the engine jacket.



Detail of Mack thermostatic valve in cylinder-head raiser

"Read Your Policy"

THE Waukesha Motor Co., Waukesha, Wis., has devised a unique method to get users of their engines to pay attention to operating directions. A booklet in the form of an insurance policy marked with the inscription—"Read Your Policy"—is attached to each engine shipped, and it seems quite likely that this method will get more users to at least look at the direction book than the ordinary method of presenting direction folders.

First with the News

Reliable, Accurate

News of the Industry

PAGE 602 VOLUME 60 *Philadelphia, Saturday, April 13, 1929* NUMBER 15

New Car Stocks Generally Considered Not Excessive

PHILADELPHIA, April 13—Following the series of new records in automobile production thus far this year which culminated in the announcement last week that the total output of passenger cars and trucks in the United States and Canada in the first quarter of 1929 was approximately 1,514,000 units, the question is being widely promulgated whether dealers' new car stocks should be considered excessive. An investigation conducted by *Automotive Industries* in the last few days reveals that only a few manufacturers have found anything to be taken as an indication of such a condition.

While new car stocks have risen to a figure considerably higher than that of last year, as noted, the greater part of this increase is credited to the high production of the Ford Motor Co., which reported practically no dealer stocks last year at this time. Some other manufacturers report that their stocks are greater than is usually the case at this time of the year, but they point to a correspondingly brighter outlook for sales.

However, the feeling has begun to exist among a number of important executives that the last half of 1929 will show little if any increase in production over the corresponding period of 1928 when the factories of the United States and Canada turned out 2,274,621 cars and trucks. It is generally believed that the seasonal decline in automobile production may be slightly more pronounced this year than last, in view of the great output already recorded.

Sales during the last several days have continued generally favorable. As is explained elsewhere in these columns, passenger car sales in Wayne County, Michigan (Detroit), during the first quarter of this year are reported at 26,614 units, almost double the record in the corresponding period last year when dealers of Wayne County parted with 14,327 passenger cars.

Dodge Plans Showing

DETROIT, April 10 — Senior Supremacy Week will be observed by Dodge Brothers dealers during the week of April 15 to 20. Besides special showroom displays of Dodge Brothers Senior models, the public will be invited to witness demonstrations to show comparisons in acceleration, power, speed, operating smoothness.

Republic is to Join American-La France

NEW YORK, April 10 — Republic Motor Truck Co. has called a special meeting of stockholders for May 15 to approve consolidation of the company with the commercial truck division of the American-La France & Foamite Corp., in a new company which is to be known as La France Republic Corp. Officers and directors of the two companies have approved tentative plans calling for the transfer of all Republic assets, including subsidiaries, and the assets of the truck division of American-La France. The American-La France plant at Bloomfield, N. J., is included and is to be sold and the activities of the new corporation concentrated at the Republic truck plant at Alma, Mich.

Financing of the new corporation will include assumption of outstanding $1,150,000 in 10-year 6½ per cent collateral trust sinking fund debentures of the Republic Truck Co. The Republic company will receive $909,500 in preferred stock of the new corporation. American-La France assets will be secured by $1,514,400 in preferred stock. Preferred stockholders of Republic will receive preferred stock in the new corporation on an even basis.

Charles B. Rose, president of the American La France company, is to head the new corporation.

Fruehauf Names Allman

DETROIT, April 10—Leslie C. Allman has been appointed sales promotion manager of the Fruehauf Trailer Co. Mr. Allman has been engaged in merchandising and advertising activities for 15 years.

Official Explains Favoring U. S. Cars

WASHINGTON, April 13—Of the 418,000 passenger cars registered in Australia on Jan. 1, 1929, more than 75 per cent were of American make, according to a trade bulletin issued by the Department of Commerce. About the same proportion of the 96,000 trucks and 2000 buses registered at that time were of American manufacture, also. Assistant Trade Commissioner C. F. Baldwin, Sydney, has explained that cars made in this country are adapted to meet the peculiar needs of the country and owners of these cars may avail themselves of excellent service.

Hoopes and Darlington Buy Spring Firm Stock

PHILADELPHIA, April 11—Hoopes, Bro. & Darlington, Inc., of West Chester, Pa., prominent truck and passenger car wheel manufacturers, have purchased 56 per cent of the common stock of Peerless Springs, Inc., of Philadelphia, manufacturers of metal ring fastened coil springs for use in mattresses, seat cushions and similar units.

Peerless Springs, Inc., will retain its identity. Thos. Hoopes, Jr., and Henry B. Coleman, while continuing as chief executives of the West Chester concern, have become president and vice-president respectively of the spring company as well. Manufacture of the springs will be transferred shortly to West Chester and carried on in the old wagon wheel plant of Hoopes, Bro. & Darlington.

Autocar Appoints Taylor

PHILADELPHIA, April 11—The Autocar Co. has promoted William G. Taylor, from plant superintendent to works manager, to succeed F. W. Ayres. Mr. Ayres left recently for Russia where, it is understood, he is to enter negotiations pertaining to automotive development with the Soviet Government. A. J. Brandt, formerly coordinating executive for Autocar, also is said to have left for Russia to confer with Soviet officials.

Bendix-Gen. Motors Deal Is Reported

Seven Major Firms Named in $140,000,000 Aviation Project

NEW YORK, April 11—Richard F. Hoyt, chairman of the board of the Wright Aeronautical Corp., told a representative of *Automotive Industries* late this afternoon (as the publication was going to press) that negotiations for the formation of a $140,000,000 aviation accessory corporation, embracing the General Motors Corp., the Bendix Corp., the Wright Aeronautical Corp., Curtiss Aeroplane & Motor Co., Inc., Electric Auto-Lite Co., Stromberg Carburetor Co. of America, Inc., and the American Brown Boveri Electric Corp., were still pending and that it was expected that a definite announcement would be made on April 13.

While the report concerning such a merger, up to this time, has been termed as purely a rumor by officials of the companies named, it is generally accepted in financial and industrial circles to be lacking only in official confirmation.

It is said that a new organization is to take the form of a holding corporation which is to own the Bendix company, the Eclipse Machine Co., the Stromberg company, Scintilla Magneto Co., an American Brown Boveri subsidiary, and a new corporation now being formed to take over the developments of Delco Remy, a General Motors subsidiary.

The new company centers around Bendix as a nucleus, with the intention, it is said, of making it the outstanding agency in aviation accessories. The new company is intended to serve the aviation industry in the same capacity that Bendix has served the automobile industry, except that its line of production is to be widely extended.

With one exception, virtually every aircraft manufactured is equipped with a Bendix starting device, exclusively produced by the Eclipse Machine Co. This company, owned 55 per cent by the Bendix Corp. and 45 per cent by the Electric Auto-Lite Co., would bring the latter company into the project.

The affiliation of General Motors and Electric Auto-Lite with the new company would, it is understood, reserve for the accessory organization any further developments in aviation ignition and lighting by the former company. The Scintilla Magneto Co. has developed an airplane magneto for which it holds contracts for the United States Army and Navy planes and the products of Curtiss and Wright. These two aviation companies would be brought into the organization through the inclusion of Stromberg Carburetor. Mr. Hoyt and C. M. Keys, president of the Curtiss company, are both directors of Stromberg.

It is understood that the new undertaking will not require public financing, the acquisitions being proposed on a stock exchange basis. Cash requirements in the present plan are said to be provided for in the subscription to stock in excess of the quota under the exchange plan by certain of the participants and a block of stock to go to the bankers in the transaction.

Ford Statement Reveals Large Drop in Surplus

BOSTON, April 10—The Ford Motor Co. reported to the Commissioner of Corporations of Massachusetts a profit and loss surplus of $582,629,563 as of Dec. 31, 1928, as compared with $654,-851,061 for 1927. The loss indicated, $72,221,498, did not consider any dividends withdrawn by Henry Ford, Mrs. Ford, or Edsel Ford, the three owners of the company.

Plant reorganization, which caused an indicated loss of $42,786,727 in 1927, taken in connection with the following reports makes it unlikely that any dividends were withdrawn by the stockholding trio. Among the liabilities listed in the report was capital stock of $17,264,500.

Air Syndicate Formed

DETROIT, April 10—A group of 44 of the leading manufacturers, bankers, and business men of Detroit have created a $5,000,000 fund to be known as the Detroit Aviation Syndicate, formation of which was completed yesterday. The syndicate will give financial help to such aviation projects as its executive committee finds worthwhile, according to Edward S. Evans, president of the Evans Auto Loading Co., who is instrumental in the formation of the new group. Mr. Evans did not identify the men associated with him in the project.

G. M. Plans Exhibit

NEW YORK, April 13—The General Motors Corp. will conduct a nation-wide exhibition of all its passenger cars during the week of April 20 to 27. This event, which will be known as the General Motors Spring Showing, will involve 23,000 dealers, each acting as an individual exhibitor. It is estimated that more than 125,000 cars will be shown.

Plymouth to Show Cars

DETROIT, April 9—Plymouth dealers throughout the country will hold a national display and demonstration week, April 20 to 27. During this period the public will be invited to view the cars in the dealer's showrooms and also to receive road demonstrations.

Graham-Paige Producing Sedan

DETROIT, April 9—Graham-Paige Motors Corp. announces that its two-door five-passenger sedan, previously described in *Automotive Industries*, has now been placed in production.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES.

NEW YORK, April 11—There has been some falling off in the jobbing trade since the Easter season, but trade and industrial activities continue to show a pronounced increase over the level of a year ago At the beginning of April, most industries were operating at very satisfactory levels. For the quarter ended March 31, new high records were made in the steel, automobile, machine tool, agricultural implement, and electrical goods industries.

FREIGHT CAR LOADINGS

Car loadings for the week ended March 23 totaled 960,968 cars, which marks an increase of 10,504 cars over those in the corresponding week last year, but a decrease of 42,838 cars below those in the corresponding week two years ago.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended April 6 stood at 97.9, which compares with 98.3 for both the week before and two weeks before.

BANK DEBITS

Bank debits to individual accounts outside of New York City for the week ended April 3 were 6 per cent above those in the corresponding week last year.

STOCK MARKET

The stock market last week was depressed most of the time, with the general trend toward slightly lower levels. Trading was on a greatly reduced scale. Call money ranged from 6 per cent to 15 per cent. The reiteration by the Federal Reserve Board of its intention to reduce the huge absorption of funds tied up in the call money market tended to curb speculative enthusiasm. Brokers' loans in New York City decreased $87,000,000 during the week ended April 3 and on that date stood at $5,562,000,000.

FEDERAL RESERVE STATEMENT

The consolidated statement of the Federal Reserve banks for the week ended April 3 showed an increase of $5,700,000 in holdings of discounted bills and decreases of $33,700,000 in holdings of bills bought in the open market and of $1,300,000 in holdings of Government securities. The Reserve ratio on April 3 was 71.5 per cent, which compares with 71.3 per cent a week earlier.

Announce New Windsor Line

ST. LOUIS, April 10—As a companion line to the Windsor White Prince, the Windsor Corp. of St. Louis, will produce in the near future a six-cylinder series of automobiles with four-speed forward transmissions, to be known as the Windsor 6-77, C. W. Burst, president, has announced. The prices of the new line will range from $1,545 to $1,895.

McAneeny Elected Hudson President

Whittaker and Barit Named Officers; Johnson, Baits and Webber Directors

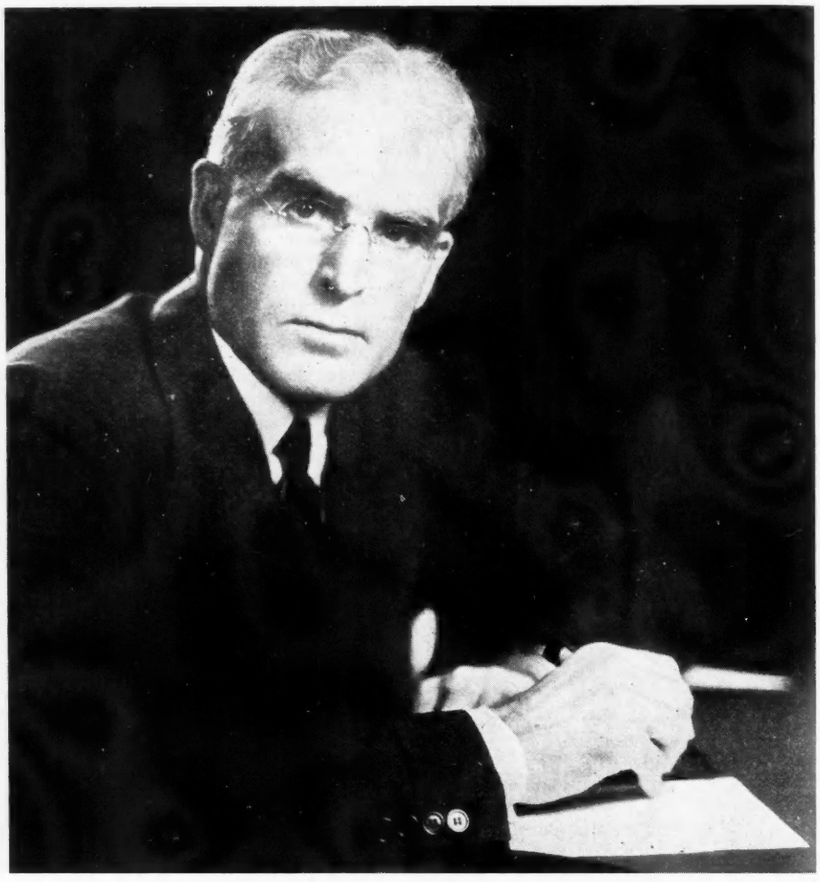
DETROIT, April 10—William J. McAneeny, who has been identified with the Hudson Motor Car Co. since its formation in 1909 and has served since 1923 as first vice-president and treasurer, was today elected its president, to succeed the late Roscoe B. Jackson, who died March 19 while in Mentone, southern France. J. H. Whittaker was elected first vice-president and assistant general manager, and A. Barit, vice-president and treasurer. Three directors of the company were elected. They are: Courtney Johnson, general sales manager; Stuart G. Baits, chief engineer, and R. H. M. Webber, president of the J. L. Hudson Co.

In his two decades with Hudson, Mr. McAneeny has served successively as purchasing agent, factory manager, a director, secretary and first vice-president and treasurer. He had been the president of Essex Motors since its formation in 1918, retaining this office after the Essex activities were merged with those of Hudson in 1922. Mr. McAneeny's connection with the automobile business followed closely upon his service in the Spanish-American War.

He had entered active duty as a private in the 47th Regiment, New York National Guard, and had been appointed company clerk. When the company was mustered out, the captain invited the young man to seek his assistance in obtaining a job if he should find such a need. This invitation did not remain open long because the first work the young soldier got was not to his liking. Through the assistance of the former army officer, he became storekeeper and purchasing agent for Riker Motor Vehicle Co., Elizabeth, N. J. He remained there from October, 1899, until 1903, when he became purchasing agent of the Electric Vehicle Co., Hartford, Conn.

Convinced that Detroit was the center of the automobile industry, he moved to this city in 1908 and joined the Chalmers-Detroit Motor Co. There he met a group of executives who were organizing a new concern—the Hudson Motor Car Co. He joined them in October, 1909, as purchasing agent. In the early days of Hudson, Mr. McAneeny's ability and energy won him rapid advances and an ever widening influence. Although he was not an engineer, Mr. Aneeny was an able student of design. He knew manufacturing operations in every detail and could call hundreds of Hudson workmen by name.

The new Hudson president is an enthusiastic golfer. He is a member of several clubs in Detroit. Besides his home here, he has residences at North Windham, Conn., and at Palm Beach.



William J. McAneeny, president of the Hudson Motor Car Co.

Viking Service Men Meet

DETROIT, April 10 — Oldsmobile service supervisors from all parts of the United States are in Lansing this week studying methods to be followed in servicing the new Viking car. Representatives of General Motors Corp., General Motors Export Co., United Motors Service Corp., General Motors Co. of Canada, Ltd., Fisher Body Corp., AC Spark Plug Co., and other affiliated companies are attending the sessions. The visitors were welcomed by T. H. Stambaugh, general service manager.

A.A.A. Surveys Car Taxes

WASHINGTON, April 9—State motor vehicle taxes increased twice as much as motor vehicle registrations in 1928 and the average per vehicle tax for the country increased six per cent in 1928 over 1927, according to the annual survey of the American Automobile Association.

G.M. Adds Employees' Aid

NEW YORK, April 9—The General Motors Corp. during 1928 broadened its group insurance plan for employees, to include increased death benefits and health and non-occupational accident insurance, according to the recent annual report of the corporation. Also during the year, General Motors developed a plan, announced a year ago, affording its employees training for responsibility and management, through the founding of the General Motors Institute of Technology at Flint.

Most of Ford, Ltd., Stock Believed to be in U. S.

NEW YORK, April 10—Close to 90 per cent of the 2,800,000 shares of Ford Motor Co., Ltd., of England offered in London four months ago has come to this country, in the opinion of bankers and curb brokers. The Ford family, however retained 60 per cent of the total of 7,000,000 shares so that the family still maintains control of the company.

Ford Motor Co., Ltd., will control about 60 per cent of the capital of the Ford companies in Continental European countries, with the remaining 40 per cent distributed nearly as possible to the nationals of these countries. It is expected that during 1929 stock in all these Continental European companies will be issued.

Maurice Switzer

NEW YORK, April 9—Maurice Switzer, vice-president of the Kelly-Springfield Tire Co., died at Atlantic City April 7 after an illness of about four weeks. He was 58 years old.

Mills Concentrate on Steel Shipments

Efforts to Send Tonnages Promptly Exceed Work of Production

NEW YORK, April 11—Intensive as are the efforts of the steel mills to speed up production, they do not begin to compare with the energy that is being put forth at present to send steel on its way to consumers' plants with a minimum of delay between finishing operations and the loading of cars. To some extent S. O. S. messages from buyers who apprehend interruption of their own operating schedules if the required steel does not arrive on time are responsible for this. A greater factor, however, is that steel mill executives are more than eager to ship every possible ton "while the shipping is good."

At a time of the year when the outlook is usually disappointing, many steel producers have orders to carry them into June at very near capacity operations. What new business is being placed carries higher prices than prevailed during the first quarter. The only possible slip-up in this unprecedented prosperity can come from consumers asking for postponement of shipments.

Experience has shown that such requests for postponement of shipment never come singly, but invariably are resorted to by all consumers when conditions make them necessary, and therefore affect the steel industry as a whole. For that reason the rate of production at automotive plants is nowhere being watched more closely just now than in the steel market, and for the same reason shipping has come to be the most important of steel mill operation. For the first time in the American Iron and Steel Institute's history, production records for any one month went beyond the 5,000,000-ton mark last month when 5,049,176 tons were reported by companies representing 94.6 per cent of the country's total output.

Pig Iron—With second-quarter demand fairly well covered, consumers are purchasing in somewhat more leisurely fashion. The market, however, is decidedly firm, with producers claiming that considerable by way of second quarter requirements, especially of malleable, remains to be ordered.

Aluminum—Switching from copper to aluminum by consumers who can use either metal continues to be the uppermost market topic. So far, however, this seems to affect primarily European markets. Demand is good and the market naturally firm under these conditions. One importer is reported to have sold his entire allotment for 1929. The domestic producer is believed to be operating his fabricating subsidiaries at capacity.

Copper—Conservative opinion inclines to the view that although there may be another flare-up, possibly bringing 25 cent copper, recession to more moderate levels is not very far off. One market authority predicts a price below 17 cents in the not distant future. The Boston News Bureau reports that the cost of laying down copper from the Andes Copper Mining Co.'s properties at Bridgeport, Conn., including all charges, depreciation, depletion, taxes, and ocean freight, is 7.80 cents per pound.

Tin—Early this week the market was weak and bargains were abundant.

Lead—The leading interest announced a $5 per ton cut in prices on Monday. Storage battery demand is fair.

Zinc—The market rules quiet with consuming demand rather slow.

Olds Start Building

LANSING, April 9—The Olds Motor Works have begun construction of their new administration building in this city, which is to be completed about Dec. 1, according to I. J. Reuter, president and general manager of the company. The building, which will occupy a city block, will have a frontage of 316 ft. and an average depth of 85 ft. It will be four stories in height and will contain 94,168 sq. ft. of floor space. There will be accommodations for about 350 employees, affording more than twice the facilities heretofore available to the administrative departments.

Savoia Marchetti Begun

NEW YORK, April 11—The American Aeronautical Corp. has started work on the erection of the south wing of its factory on Manhasset Island, Port Washington, L. I., and expects its completion late in June. In the meantime, work is proceeding toward the assembly of the first American built Savoia Marchetti planes in a temporary factory at Whitestone, L. I., where it is expected that the first Baby Amphibian will come out of line some time in June.

Burst Announces Project

ST. LOUIS, April 10—C. W. Burst, president of the Moon Motor Car Co. and of the Windsor Corp., has announced a project of the two companies to manufacture a recently-perfected cotton-picking machine. The name of the organization from which the contract to manufacture this device was obtained and the identity of the marketing organization were not disclosed.

Oakland Ships 36,460

DETROIT, April 9—The Oakland Motor Car Co. shipped 36,460 cars in March, compared with 29,477 in June, 1928, the previous all-time record for one month. W. R. Tracy, vice-president in charge of sales, said indications are that high production will be continued by the company during the coming months, and he predicted that the second quarter of 1929 will see a high mark established for that period.

Autocar Enlarges Branches

ARDMORE, PA., April 9—The Autocar Co. announced that it has moved its branches at Columbus, Ohio, and Lawrence, Mass., into new and larger quarters as a result of recent expansion.

Buick Will Produce New Low-Priced Six

Company Will Introduce Car in Early Summer Under New Name

DETROIT, April 10—E. T. Strong, president of the Buick Motor Co., has announced that the company has designed a new six-cylinder car which it will produce in addition to its present line and which it will market under another name at a comparatively low price. According to Mr. Strong, the car will be built entirely within the Buick plants.

It will be entirely different in appearance from the company's present line, with which it will conflict in no way, according to the Buick president. Mr. Strong said that the first showing of the new car, which has been thoroughly tested by the company's engineers, will be made in early summer. He explained that this new product will make an attractive combination with Buick's present line, adding a Buick-built car to the lower-priced field. It is intended to increase considerably the number of the company's steady customers.

The company will announce the name of its new product within a few weeks together with the dealer organization for marketing it, it was explained.

Studebaker, Pierce-Arrow Unite Overseas Business

SOUTH BEND, April 11—Formation of the Studebaker-Pierce-Arrow Corp. to conduct the overseas business of the Studebaker Corp. of America and the Pierce-Arrow Motor Car Co. was announced today by A. R. Erskine, president of Studebaker and chairman of the Pierce-Arrow Board.

The new corporation will have its headquarters at South Bend. It is not intended that any major changes shall be effected in the policies of the Studebaker export organization except that further expansion will be made, Mr. Erskine said.

The officers of the new company are: P. G. Hoffman, chairman of the board; H. S. Welsh, president; J. L. Overlock, vice-president; H. E. Dalton, secretary, and E. L. Lalumier, treasurer. Organization of the new company comes at a time when the export business of both manufacturers is at a high mark, it is explained. Pierce-Arrow export sales for the first three months of 1929 were 66 2/3 per cent greater than for the year 1928.

Citroen Viewing Uruguay

WASHINGTON, April 11—The Citroen Automobile Company of France has sent its commercial director and three engineers to the River Plate, Uruguay, to study the market and inaugurate a widespread propaganda in favor of their new model, the Department of Commerce announced.

Men of the Industry and What They Are Doing

Haynes, Back from Trip, Predicts Active Summer

DETROIT, April 9—Frederick J. Haynes, who has just returned to this city from his first trip to the Pacific Coast since he assumed the presidency of Durant Motors, Inc., three months ago, has predicted that automobile sales will maintain high levels in the West throughout the summer.

"The one thing that impressed me was that we didn't run into any pessimism anywhere," said Mr. Haynes. "Almost everyone seems to be working and there seems to be a general confidence in the Hoover administration which augurs well for continued prosperity. The business outlook appears bright in all the territories we visited.

During his trip Mr. Haynes addressed dealer meetings at Kansas City, San Francisco, Oakland, Salt Lake City, Denver, Omaha and Chicago. Durant dealers, he said, are enthusiastic over plans which the new management of Durant Motors is inaugurating and there is a marked spirit of cooperation manifesting itself between the new management and the Durant dealer organization. He spent several days at the Durant plant at Oakland where he also held conferences with officials.

Bauer Succeeds Beaver

Harry C. Beaver, treasurer of Rolls-Royce of America, Inc., and retiring president of the Western Massachusetts branch of the National Metal Trades Association, in his report to that body, read at its recent annual meeting, stressed the importance of apprenticeship and foremanship training. George F. Johnson, of Chicago, representing the department of industrial education of the national association, announced that about 275 men are now taking such courses in this vicinity. Louis E. Bauer, president of the Indian Motocycle Co., was elected president of the association to succeed Mr. Beaver.

Stutz Names Begg

R. S. Begg has been appointed chief engineer of the Stutz Motor Car Corp. of America, Inc., according to an announcement by Col. E. S. Gorrell, president of the company. Mr. Begg was formerly chief engineer of the Edward G. Budd Mfg. Co. and for 11 years earlier he was chief engineer of the Jordan Motor Car Co.

Shumaker Joins Heywood

Foye Shumaker has resigned his position as assistant secretary of the Aircraft Bureau of the Detroit Board of Commerce to become advertising manager for the Heywood Starter Corp., Detroit, manufacturer of the Heywood high pressure injection self starter for airplane engines.

Roy E. Cole

New Chief Engineer, Durant Motors, Inc. His appointment to this position was announced in Automotive Industries last week. Until recently, Mr. Cole was chief engineer, Dodge Brothers Corp.

Sommer Gets Latvia Post

The promotion of Fred C. Sommer of New York City, to the post of U. S. trade commissioner at Riga, Latvia, was announced this week by the Bureau of Foreign and Domestic Commerce. For the past nine months Mr. Sommer has been serving as commercial agent in the Bureau's New York Office.

Case Reelects Officials

J. I. Case Threshing Machine Co. has reelected its directors with the exception of W. J. Davis. This vacancy has not been filled. Richard P. Howell, assistant treasurer, was elected treasurer. Other officers were reelected.

Yordon Leaves Laminated Shim

J. C. Yordon has resigned as assistant general manager of the Laminated Shim Co., Inc., Long Island City, N. Y., a position he held for 12 years, and has become sales manager of the Erie Heating Systems, Inc., of New York.

Anderson Joins Consolidated

E. C. Anderson, formerly with the Stocker-Rumely-Wachs Co., Chicago, has joined the sales force of the Modern Tool Division, Consolidated Machine Tool Co., at its Chicago office.

Young Returns From West

DuBois Young, president and general manager of the Hupp Motor Car Corp., and Mrs. Young have returned to Detroit after six weeks in California.

Pulscher Back From Trip

Martin Pulscher, president and general manager of the Federal Motor Co., and Mrs. Pulscher have returned to Detroit after a visit to Atlantic City.

Wright Medal Will Go to Havill for S. A. E. Paper

WASHINGTON, April 13—Lieutenant Commander C. H. Havill, in charge of the propeller section of the Bureau of Naval Aeronautics, Navy Department, will be the first recipient of the Wright Brothers Medal donated by the Society of Automotive Engineers. He will receive the award at a dinner to be held at the conclusion of the Detroit Aircraft Show tomorrow.

The medal goes to Havill for his paper on "Aircraft Propellers" submitted last year to the Society. The paper described the officer's research work performed while on duty at the Bureau since March, 1927. The idea of awarding a medal originated in 1924 but Havill's paper was the first considered worthy of the award.

Peerless Reelects Directors

The Peerless Motor Car Corp., at its recent annual meeting at Richmond, Va., reelected the following members of its board of directors: Alfred Fritzsche, L. R. German, E. H. Parkhurst, F. A. Trester and C. E. Sullivan, of Cleveland, C. H. Larson, of New York, and D. P. Smith, of Detroit. R. M. Calfee, former chairman of the board, who asked to be relieved of his duties, will continue as the company's counsel. Mr. German, the president, reported that the first quarter of 1929 was the biggest in the history of the company.

Metal Aircraft Names Peterson

C. G. Peterson has been appointed director of sales for the Metal Aircraft Corp., Cincinnati, manufacturer of the Halpin "Flamingo." Mr. Peterson for a number of years was vice-president in charge of sales for the Wright Aeronautical Corporation and later was associated with the Claude Neon Light Co. in the development and sales of aircraft beacon and other lighting equipment.

McKim Joins Valentine & Co.

R. S. McKim, who for the last seven years has been with the Engineering Division, United States Air Service, has joined the staff of Valentine & Co. He will be engaged in the Valentine special service to manufacturers of aircraft, advising in the needs for finishing material and methods especially suited to rigorous air service.

Palmer Succeeds Fordon

Bruce Palmer has been named district sales representative in charge of the Detroit office of Thompson Aeronautical Corp. Mr. Palmer graduated from the United States Naval Academy in 1922. He succeeds T. N. Fordon in his new position.

Fairchild Aviation Joins New Company

Increases Stock to 760,000 Shares in Becoming Part of $200,000,000 Firm

NEW YORK, April 9—Fairchild Aviation Corp. has become a part of the recently organized Aviation Corp., a $200,000,000 holding and developing company. In order to facilitate this transaction, the capital stock in Fairchild Aviation Corp. has been increased from 560,000 to 760,000 shares, of which 530,000 will be outstanding. Stockholders will hold 380,000 shares and 150,000 will be held by the Aviation Corp. The Aviation Corp. plans to acquire about 40 per cent of the stock now held by stockholders, making 302,000 shares or approximately 56 per cent of the outstanding shares.

The Aviation Corp. purchased 150,000 shares of Fairchild for 210,000 shares of its own stock and has offered Fairchild stockholders an exchange on the basis of 1 2/5 shares of its stock for outstanding shares of Fairchild up to 40 per cent of any person's holdings. The Aviation Corp. recently made a somewhat similar offer for the acquisition of control of Universal Aviation Corp., a Chicago operating concern.

Sherman M. Fairchild, president of the Fairchild Corp., issued the following statement:

"That control of our companies passes to the Aviation Corp. will in no wise affect their present management. The increased capital which will thus be made available will be devoted to expansion and improvement of our plants and products. It gives the Fairchild Aviation Corp. even greater stability than it has enjoyed before. After these transactions are completed, Fairchild will have net current assets approximating $6,500,000.

Bohn to Spend $250,000 on New Extrusion Plant

DETROIT, April 9—Charles B. Bohn, president of the Bohn Aluminum & Brass Corp., has announced that work is starting immediately on a new aluminum extrusion plant, extending the company's plant No. 5 at a cost of $250,000, including initial equipment for the new building which will cost more than $100,000. The new plant will be 120 by 300 ft., according to Mr. Bohn.

"With every department of our business going at top speed," said Mr. Bohn, "and with most departments working overtime, an unusually big year for our business is indicated. Only last January we started in to produce aluminum extrusion for automobile body construction. In four months' time we are forced to expand this department."

"Although we just started shipping in January," Mr. Bohn continued, "the actual shipments for February were double those of January, while March shipments show a further increase of more than three times the February shipments. A schedule for April indicates an increase of about 50 per cent. During April Bohn business will be the largest in its history by more than 30 per cent."

Estate of W. L. Velie, Sr., Will Pay Tax of $100,067

MOLINE, ILL., April 8—Willard L. Velie, Sr., who died suddenly last fall, left an estate estimated at $2,549,849 against which an inheritance tax of $100,067—the largest ever paid in this county—has been assessed. Mr. Velie was president of the Velie Motors Corp. The net estate, upon which the tax was figured, was $1,690,000. Real estate in the inventory was listed at $176,572 and personal property, consisting chiefly of stocks, bonds and other securities, $2,373,277.

The widow's share is $399,370 and the son's share, $444,462, goes to the latter's widow and two children, in addition to shares of $56,656 bequeathed to them by the elder Velie. Mr. Velie, Jr., died on March 20, his will placing the share of his father's estate left him, in a trust fund for his family.

Report was made this week also upon the estate of George A. Stephens, former Moline implement and automotive manufacturer, and value of that estate is fixed at $221,007, his widow, Mrs. Nancy Stewart Stephens, receiving $101,169, his daughters, receiving $73,669 each. Tax in that estate amounted to $4,540.

Output of Planes in U. S. Fixed at 4600 in 1928

WASHINGTON, April 11—The United States led the world in aircraft production during 1928, according to an announcement this week by the Department of Commerce. While strictly comparable figures are not available, the Department estimates production in this country at 4600 planes of all types as compared with 1440 for France, 475 for Italy, 300 for Germany, and 25 for Switzerland. In 1927 the United Kingdom produced approximately 204 commercial planes, the Department says.

Exports of planes, parts and engines last year had a value of $3,664,723, or $49,706 less than the total value of exports for the preceding three years, the Department points out. Exports of airplanes, seaplanes and amphibians numbered 162 and had a value of $1,759,653; exports of airplane parts had a value of $1,240,244; and exports of airplane engines numbered 179 and had a value of $664,826. In 1927 63 airplanes valued at $848,568 were exported, exports of parts had a value of $570,117, and the number of engines exported was 84 having a total worth of $484,875.

Financial Notes

Pines Winterfront Co. stockholders have approved an increase in the authorized capital stock to 500,000 shares of $5 par common stock from 50,000 shares of Class A and 50,000 shares of Class B stock. Holders of the Class A and Class B shares will exchange their holdings for the new common stock on a share-for-share basis and stockholders of record April 15 will be offered the privilege of purchasing two additional shares for each one held at $11 a share. The rights expire May 9. Temporary certificates for the new common stock will be issued on May 16.

The Fruehauf Trailer Co. and subsidiary for the year ended Dec. 31, 1928, report a net income of $285,312, in comparison to a net income of $160,628 for the previous year. The net earnings of the company since 1924 follow: 1924, $55,707; 1925, $113,846; 1926, $102,490; 1927, $160,628. March, 1929, was the best month that the company has ever had and with the completion of its new building the firm is occupying 15 per cent more floor space than it has in the past. The First National Co. of Detroit, has offered 10,000 shares of the Class A convertible 7 per cent preferred stock of the firm at $50 a share and accrued dividends last December.

Allied Motor Industries, Inc., a holding company for the Henney Motor Co., Weatherproof Body Corp., and the Van Sicklen Corp., reports net earnings for 1928, after adjustments to eliminate nonrecurring expenses, as $234,349. Total earnings of the individual companies for the entire year exceeded $1,000,000, but as most of the companies were acquired toward the end of the year the first annual statement of the corporation reports only that part produced under its management.

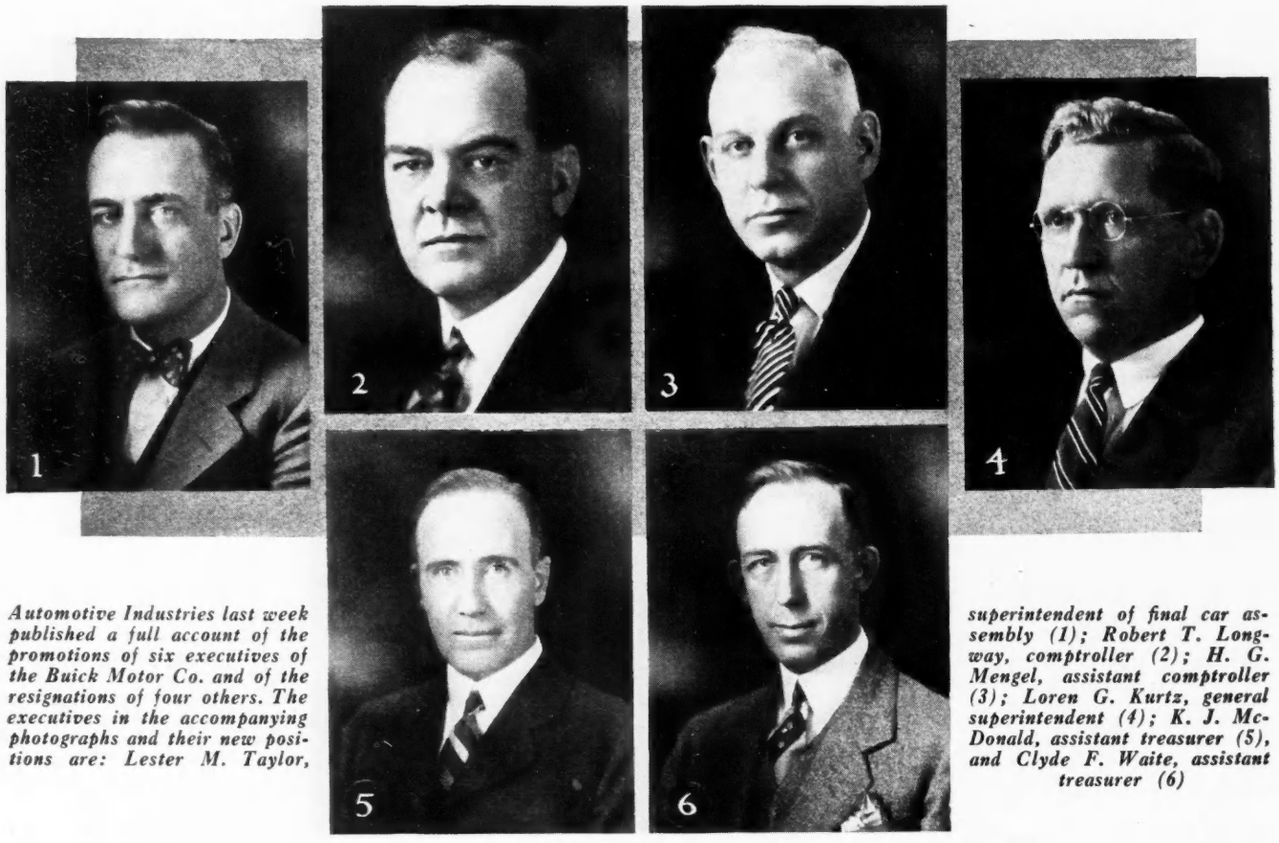
Jordan Motor Car Co. stockholders are to meet April 24 to vote on a proposal to increase the common capital stock from 300,000 to 500,000 shares, as a means of wiping out funded debt of the company. If the plan is approved 150,000 shares will be offered to stockholders of record April 1 at $12 in a ratio of one share of new stock for each two of the old held. As the stock will not be underwritten, the entire $1,800,000 will be available to the company.

Yellow Truck & Coach Mfg. Co., a subsidiary of General Motors Corp., reports a net loss for the year ended Dec. 31, 1928, of $1,104,411 as compared with a net loss of $6,858,692 including write-offs for the year 1927. Dividends on the preferred stock were in arrears to the amount of $1,050,000 on Dec. 31, 1928. All operations of the company at Chicago have been discontinued and centralized in the new plant at Pontiac.

Morris Motors, Ltd., (England) reports that profit earned in 1928 was almost the same as that of 1927, viz., £1,314,089, as compared with £1,334,907. In 1926 it was £1,001,634. After paying the dividend on the 7 per cent preference shares and income tax, there is a balance of £829,853.

Mullins Mfg. Co. has declared quarterly preferred stock dividend of $1.75 payable May 1 to holders of record April 20.

Six Buick Executives Recently Promoted to Higher Positions



Automotive Industries last week published a full account of the promotions of six executives of the Buick Motor Co. and of the resignations of four others. The executives in the accompanying photographs and their new positions are: Lester M. Taylor, superintendent of final car assembly (1); Robert T. Longway, comptroller (2); H. G. Mengel, assistant comptroller (3); Loren G. Kurtz, general superintendent (4); K. J. McDonald, assistant treasurer (5), and Clyde F. Waite, assistant treasurer (6)

Hupp Reduces Prices on Its Eights and Sixes

DETROIT, April 8—Price reductions ranging from $55 to $260 and affecting all models of the Century Eight and six-cylinder lines have been announced by the Hupp Motor Car Corp. On the Straight Eight series the price reductions range from $80 to $260 while on the Sixes the reductions range from $55 to $160. The new prices are as follows:

Straight Eight Custom Equipped: Cabriolet, $1,845; Roadster, $1,815; 4-pass. Coupe, $1,860; Sedan, 2-door, $1,845; Sedan, 4-door, $1,905.

Straight Eight Standard Equipment: Cabriolet, $1,755; Roadster, $1,725; 4-Pass. Coupe, $1,770; Sedan, 2-door, $1,775; Sedan, 4-door, $1,815.

Century Six, Custom Equipment: Sedan, 2-door, $1,335; Sedan, 4-door, $1,440; Cabriolet, $1,475; Roadster, $1,480; 4-Pass. Coupe, $1,450.

Century Six, Standard Equipment: Sedan, 2-door, $1,245; Sedan, 4-door, $1,350; Cabriolet, $1,385; Roadster, $1,390; 4-Pass. Coupe, $1,360.

Announce German Delegates

NEW YORK, April 11—Herr Kaufmann, formerly director of the Public Autobus Association of Berlin, will head the German Tax Commission which will arrive in this country on April 22 at the invitation of the National Automobile Chamber of Commerce to study the gasoline tax. Privy Counsellor Dr. Allmers, chairman of the German Association of Automobile Manufacturers, will represent the automotive industry. Herr Staiger, New York, will represent the German automobile dealers and the German Tire Association will be represented by Dr. Koennecke, its president.

Otis Steel Expanding

CLEVELAND, April 8—The Otis Steel Co. is increasing the production of full-finished sheets by 1000 tons monthly to a total of 10,000 monthly. The improvement calls for an expenditure of $200,000, and it includes building of a 200 by 91 ft. warehouse for finished sheets, two new cold-rolled mills, and the enlarging of two mills to make 63-in. wide sheets. The change of the sheet mills is in response to a growing demand from automobile producers.

Nash Earns $4,118,870

KENOSHA, WIS., April 11—Directors of the Nash Motors Co., meeting here yesterday, declared the regular quarterly dividend of $1.50 per share, payable May 1 to stockholders of record April 20. Earnings for the first quarter of the fiscal year, which began Dec. 1, were reported as $4,118,870, after all expenses, including provision for taxes and depreciation. This compares with $2,604,378 for the corresponding period last year, an increase of 58.1 per cent.

Lamont Succeeds Hoover as Conference Chairman

WASHINGTON, April 11—The National Conference on Street and Highway Safety announced this week that Secretary of Commerce Robert P. Lamont had accepted the chairmanship of the conference, succeeding President Hoover, who served as chairman from 1924 until his election to the Presidency.

William E. Metzger, of Detroit, chairman of the Conference Executive Committee, extended to Secretary Lamont the invitation to head the conference. Others included in the invitation were: William Butterworth, president, United States Chamber of Commerce; H. M. Starling, American Automobile Association; Lucius S. Storrs, American Electric Railway Association; Dr. Julius H. Parmelee, American Railway Association; John C. Long and Pyke Johnson, National Automobile Chamber of Commerce; Sidney J. Williams, National Safety Council; Col. A. B. Barber, United States Chamber of Commerce, director of the conference, and A. K. Kohler, secretary.

Test Diesel in Flight

WASHINGTON, April 11—A Junkers "G 24" commercial plane, equipped with a Diesel engine developing 600/700 hp., completed a successful flight of 10 minutes, at Dessau, Germany, according to an announcement this week by the Department of Commerce.

Sales in Detroit Aggregate 26,614

First Quarter Business is Nearly Double That of Last Year

DETROIT, April 9—Passenger car sales in Wayne County (Detroit) during the first quarter of 1929 totaled 26,614, or almost double the sales enjoyed during the corresponding period of 1928, when 14,327 passenger cars were sold. While Ford cars are responsible for a large portion of this gain, a survey of the figures shows that increased buying this year has extended to a large number of makes. Ford, for instance, sold 9571 cars in the first quarter, compared with 1473 in the first quarter of 1928. Chevrolet sold 4550 in the first three months of 1929, compared with 3454 in the corresponding period of last year. Essex also enjoyed an unusual increase, selling 3190, compared with 2104 last year.

Graham-Paige sold 610, or almost double the first quarter of 1928, with a total of 314. Hudson sold 781, compared with 433 last year; Nash 342, compared with 217; Oldsmobile 741, compared with 362; Pontiac 1400, compared with 1088; Whippet 803, compared with 453; Buick 898, compared with 804; Willys-Knight 162, compared with 66 last year; Packard 232, compared with 215; Peerless 49, compared with 31; Pierce-Arrow 33, compared with 9.

More automobiles were sold at retail during March than during February and January combined. March sales totaled 13,892 passenger cars, of which 4652 were sold by Ford, 2295 by Chevrolet, 1731 by Essex, 834 by Pontiac, 464 by Whippet, 463 by Buick, 415 by Hudson, 402 by Oldsmobile, and 349 by Graham-Paige.

February Exports $61,529,748

WASHINGTON, April 11—Exports of automotive products from the United States in February amounted to $61,529,748, exceeding January shipments by $13,936,093, or 29½ per cent, and those in February of last year by $24,972,022, or 68 per cent, according to an announcement this week by the Department of Commerce. (This figure for February includes a number of additional items which did not appear in the table published in *Automotive Industries* last week, such as parts and accessories for motor boats, spark plugs and certain electrical equipment.)

Frank A. Gaynor

NEW YORK, April 10—Frank A. Gaynor, aged 48 years, assistant general counsel of the General Motors Corp., died at his home in Rye, N. Y., last night. He had been ill since January.

Esthonia to Reduce Duty on Vehicles

WASHINGTON, April 11—A reduction in the Esthonian import duty on motor vehicles is provided for in the new most-favored-nation commercial treaty signed March 15 by Esthonia and France, according to a cable received this week by the Department of Commerce. Automobiles are now dutiable in Esthonia on a weight basis but under the new agreement a horsepower basis will be substituted.

Car Sales in Chicago Increase 50 Per Cent

CHICAGO, April 9—The total automobile sales in Cook County (Chicago) showed a gain of practically 50 per cent over the figures for March of last year, according to the survey. The sale of 12,753 automobiles is reported in Cook County during March, compared with 8792 in the corresponding month of last year. In 34 northern counties the March total was placed at 19,059 as against 12,959 a year ago.

Much of the increase is accounted for by the return of Ford to a high rate of production. In Cook County, 3149 Fords were sold during March, as compared with 386 a year ago, and the total for the northern district was 4877 as against 602 last year.

Bearing Firm Organizing

LIMA, OHIO, April 9—Papers have been filed with the Secretary of State for chartering the Monroe Bearing Co., with an authorized capital of 1200 shares of no par stock for the purpose of manufacturing and distributing bearings for automobiles and other types of machinery. The incorporators are W. B. Monroe, John H. Monroe and D. L. Monroe.

Hayes Sets High Schedule

DETROIT, April 9—Combined schedules for May production of the Hayes Body Corp. at Grand Rapids and Ionia, Mich., and at Indianapolis, will exceed 1000 bodies a day, a new record, comparing with the previous peak of 650 cars a day reached last May, W. W. Hoagland, president, has announced.

Columbus Reports 1515 Sales

COLUMBUS, OHIO, April 00—Sales of passenger cars in Franklin County, which includes Columbus, during March numbered 1515, according to a report of Charles E. King, county clerk. Truck sales in March totaled 165 as compared with 87 in March, 1928. In passenger cars Ford led with 455 sales; Chevrolet was second with 388 sales; Essex third with 179.

U. S. Registrations Rise to 24,493,124

Survey Shows 5.9 Per Cent Increase in Motor Vehicles Last Year

WASHINGTON, April 11—A total of 24,493,124 motor vehicles were registered in the United States during 1928, according to computation of the U. S. Bureau of Public Roads and U. S. Census Bureau. This represents an increase of 5.9 per cent over the number registered during 1927, the bureau announces, and is one automobile for each five persons in the United States—population being fixed at 120,013,000.

Registration fees, paid by the motorists in 1928, totaled $322,630,025 and represented an increase of 7 per cent in the fees paid during 1927, the figures show. New York heads the list for 1928 with a total registration of 2,083,942 motor vehicles, followed by California with 1,799,890; Ohio, 1,649,699; Pennsylvania, 1,642,207; Illinois, 1,504,359; Michigan, 1,249,221, and Texas, seventh in the million class, with 1,214,297.

From a percentage gain in registrations, Arizona ranks first with 16 per cent; the District of Columbia, second, with 13 per cent; Mississippi and South Dakota tied for third place, with 12 per cent gain each; New Mexico, Alabama and Connecticut, 10 per cent gain, and Tennessee and Texas each 9 per cent gain. South Carolina, Vermont, Wyoming, North Dakota, Michigan and Delaware each reported an 8 per cent increase in registrations.

Houdaille-Hershey Meets

DETROIT, April 10—Stockholders of the Houdaille-Hershey Corp., at their annual meeting here yesterday, reelected the directors of the company and ratified all actions since the consolidation was approved on Jan. 28. Claire L. Barnes, president, said that earnings for the first quarter will exceed the combined earnings of the three constituent companies, the Houdaille Corp., the Hershey Corp., and the Oakes Products Corp., in the corresponding period last year.

Wright Heads Committee

NEW YORK, April 9—Arrangements for the reception of 100 of Europe's most distinguished engineers and scientists, who will arrive here during the summer en route to the World Engineering Congress at Tokio, have been placed in charge of Roy V. Wright, president of the United Engineering Societies, as chairman of the New York Reception Committee, according to an announcement made by Maurice Holland, executive secretary of the American Committee of the Congress, which has its office at 29 W. Thirty-ninth St., New York City.

Cincinnati Concern Obtains Parts Plant

CINCINNATI, April 9—Aluminum Industries, Inc., manufacturer of aluminum alloy replacement pistons, has purchased the Diamond Motor Parts Co., St. Cloud, Minn., maker of automotive replacement parts, which for several months has been operating under a receivership. While terms of the sale were not disclosed, the appraisal value of the plant, equipment and inventory of the Diamond company was fixed at $1,250,000.

The products of the St. Cloud plant, which is to be operated solely as a manufacturing and shipping division, will be marketed under the name of the Permite-Diamond line. The Aluminum company recently announced a new Permite Unitype piston. The company will promote the sale of the combined products to automobile manufacturers through its Detroit office, and an intensive advertising campaign has been launched. Aluminum Industries, Inc., recently listed $2,500,000 of its stock on the Cincinnati Stock Exchange and the New York Curb.

Negotiations for the purchase of the Diamond plant was begun some time ago by H. J. Hater, vice-president and general manager of Aluminum Industries, Inc. The offer was reported favorably to the court by the receiver and the Cincinnati company was authorized to take over operation of the plant March 1, pending final decree by the court, which was handed down yesterday. The property of the Diamond company, which was organized in 1923, represents an investment of $3,000,000 and the plant, which covers 15 acres and has 130,000 sq. ft. of floor space, has a daily capacity of 150,000 parts, which include piston pins, diochrome valves, cast iron valves, bronze bushings, steel bushings, water pump shafts, water pump impellers and mufflers.

French Tax Proves High on Used Cars

PARIS, April 6—The annual French taxes on used American cars often exceed the purchase price. The Automobile Club de l'Oest recently cited the case of one of its members who bought an eight-year-old car for $60. Before it could be put into service, taxes of $71, together with garage and insurance, involved the expenditure of $111 more. The owner in despair sold the automobile and bought four bicycles for himself and his family.

Chrysler Unit Producing

WALKERVILLE, ONT., April 9—Full-time production was started in the new plant of the Chrysler Motor Co. of Canada, Ltd. The new factory, which has floor space of 280,000 sq. ft., is being devoted to the manufacture of Plymouth and De Soto cars exclusively, with the Chrysler models being produced in the original works in Canada.

Champion Gains 37 Per Cent

DETROIT, April 9—Sales of the Champion Spark Plug Co. for the first quarter, 1929, show an increase of 37 per cent over the same period for 1928 which was the previous high mark in the company's history, officials announce.

Marmon Announces Accessories Unit

INDIANAPOLIS, April 8—Thomas E. Jarrard, general sales director of the Marmon Motor Car Co., has announced the formation of a new factory accessories department. Sales of such products will be made directly from the factory by the new department, which is under the supervision of C. A. J. Hadley, for the last 15 months a member of the Marmon sales promotion staff.

"It has become more and more apparent that accessories are an important item in the business of any retail automobile merchant," Mr. Jarrard said. "Buyers of new cars have come to look to the dealer from which they purchased their automobiles for spot lights and many other accessories and it is the dealers' place to advise them as to the accessories best suited for the model car purchased."

Mr. Hadley played an important part in sales promotion work in connection with the recent introduction of the new Roosevelt car. Before coming to Marmon, he was associated with another automobile manufacturer in a similiar capacity.

Because of the popular reception of the Roosevelt, the company has increased its total production to 250 units a day.

Industrial Tractors Gain

WASHINGTON, April 11 — Shipments of electric industrial trucks and tractors during March were 210, as compared with 134 in February, 1929, and 129 in March, 1928, according to the Department of Commerce. The figures are based upon reports from the 11 leading manufacturers in the industry, it was announced.

Calendar of Coming Events

SHOWS

Lille, Commercial .....Apr. 6-21
Milan, Trucks .....Apr. 12-27
Jugo-Slavia, Automobiles .....Apr. 20-28
Budapest Auto Salon.....May
Melbourne Automobile Show.....May 2-11
International Aircraft Exhibition, Olympia, London .....July 16-27
International Aircraft Exhibit, Coliseum, Chicago .....Sept. 7-15
Paris, Automobiles .....Oct. 3-13
London, Automobiles .....Oct. 17-26
Prague, Automobiles .....Oct. 23-30
Paris, Motorcycles .....Oct. 23-Nov. 3
M.&E.A. Show, Chicago.....Nov. 4-9
N.S.P.A. Show and Convention, Detroit .....Nov. 11-16
Berlin Auto Salon .....Nov. 14
London, Trucks .....Nov. 7-16
Paris, Trucks .....Nov. 14-24
London, Motorcycles .....Nov. 30-Dec. 7
Brussels Auto Salon .....Dec. 7

CONVENTIONS

Annual Meeting National Foreign Trade Council, Baltimore .....April 17-19
Mississippi Valley Mfg. & Wholesalers, St. Louis .....April 17
National Battery Manufacturers Association, Cincinnati .....April 24-26
American Welding Society, Annual Meeting, New York City....April 24-26
Chamber of Commerce of U. S., Meeting, Washington, D. C...April 29-May 3
National Safety Congress Meeting, Kansas City .....April 30-May 2
American Society of Mechanical Engineers, Detroit .....May 1-3
American Management Association, New York .....May 6-11
National Safety Congress Meeting, Detroit .....May 7-9
National Highway Traffic Association, Hotel Stevens, Chicago.....May 13-15
A.S.M.E. Meeting, Rochester, N. Y. May 13-16
National Hardware Association (Metal Branch) Annual Meeting, Detroit, May 16-17
American Gear Manufacturers' Association, Annual Meeting, Hotel Statler, Cleveland .....May 16-18
A.S.M.E. Aeronautic Meeting, St. Louis, May 27-30
American Society Testing Materials, Annual Meeting, Atlantic City, June 24-28
American Welding Society, Fall Meeting and Exposition, Cleveland....Sept. 9-12
A.S.M.E.—Iron and Steel Division—National Meeting, Cleveland...Sept. 11-13
Society for Electrical Development, New York City .....Sept. 13
Eastern States Exposition, Springfield, Mass. .....Sept. 15-21
National Machine Tool Builders' Association, Cleveland.....Sept. 30-Oct. 4
National Safety Congress, Annual, Chicago .....Sept. 30-Oct. 4
World Engineering Congress, Tokio, Japan .....Oct. 29-Nov. 22

RACES

Akron .....May 12
Gardner Trophy (Aircraft), St. Louis, May 28-30
Indianapolis .....May 30
Detroit .....June 9
Altoona, Pa. .....June 15
Rudge Whitworth Cup, Le Mans, June 15-16
Salem, N. H. .....June 29
French Grand Prix .....June 30
Akron .....Aug. 18
National Air Races and Show, Cleveland, Aug. 24-Sept. 2
Syracuse .....Aug. 31
Altoona, Pa. .....Sept. 2
Cleveland .....Sept. 15
Salem, N. H. .....Oct. 12

S. A. E.

Summer Meeting, Saranac Lake..June 25-28
Aeronautic Meeting, Cleveland..Aug. 26-28
Production Meeting, Cleveland.....Oct. 2-4

Sectional

New England .....April 17
Northwest Portland, Ore..... " 20